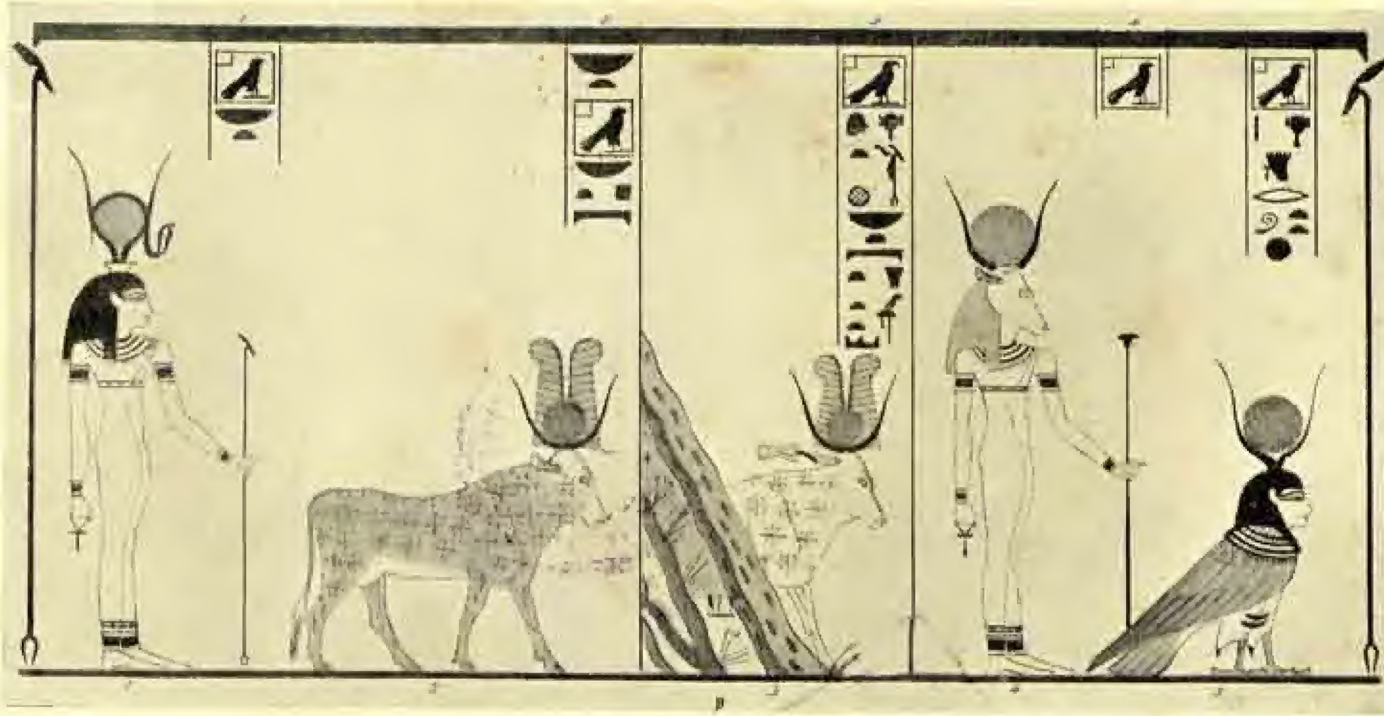

REPRESENTATIONS OF HATHOR.

Reproduced from Wilkinson's "Manners and Customs of the Ancient Egyptians."

Herodotus and later Greek writers thought that Isis was represented by a Cow and identified her with the Greek Io. Misled by this, Egyptologists at first thought that Hathor's Temple at Denderah was a temple of Isis, owing to the many representations of the Cow Goddess there. After the decipherment of the inscriptions it was recognised as a temple to Hathor, the chief deity of Denderah, while a smaller temple proved to be that of Isis.

At the New Year of the Ancients the image of Hathor was carried to the roof of the temple in order that "the goddess Hathor (Spica) might be united with the beams of her father Ra (the Sun) on this noble day, the festival day of the beginning of the year."

(*Frontispiece.*)

A SCHEME OF
EGYPTIAN CHRONOLOGY

with notes thereon
including notes on Cretan and other Chronologies

By

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PREFACE.

As reviewers of my book on Babylonian Chronology were, for the most part, generous in their comments, I am encouraged to place before the public the results of my consideration of Egyptian Chronology.

In my *Scheme of Babylonian Chronology* I added some notes on Egyptian Chronology including my theory of the Sothiac Cycle. This was rendered necessary owing to the established synchronisms between Babylonia and Egypt in the time of the Eighteenth Dynasty. I was then under the impression that no detailed Egyptian Chronology was possible owing to the absence of astronomical evidence and that dates of the early dynasties could only be given very approximately but further study has shown me that there are a number of clues on which theories may be hung which I trust may be considered worthy of attention.

The consideration of the new evidence brought in involves a difference of 5 days in the position of the Wandering Calendar prior to the Reform of Aseth, and, therefore, of roughly 20 years in my dates of Twelfth Dynasty kings; and a considerable difference in my date for Menes and the early dynasties owing to the theory that the "births" of the gods on the Palermo Stone refer to the commencement of planetary cycles which in the combinations there mentioned can probably only occur in historic time at the period to which I now refer them, reinforced as the chronology based on that theory is by the interpretation which I place on the list of Eratosthenes which seems to confirm the dates given by Manetho, and by other astronomical and calendrical evidence, without contradicting

such other evidence of value as is available. (I have also slightly altered my views in regard to the Calendar of Esneh and the Alexandrian Calendar.)

The probability in favour of the theories here put forward seems to me in some cases very high, while in others it merely amounts to possibility. Even in the case of theories which are merely possibilities, on the evidence before me the probability in favour of these theories seems higher than in that of conflicting theories so far put forward. It may well be, however, that I have sometimes misunderstood the evidence or that new evidence will be discovered which will necessitate substantial modification of my views, but the only course open to me is to state the theories which on the evidence I have appear to me to have the highest probability attaching to them.

It may be the opinion of some that mere possibilities should not be stated at all. I do not share this view. The statement of a possible theory, on however slender a clue it may depend, may give a hint to others where to look for evidence either to confirm or refute it. It is valuable to state a theory even if it has subsequently to be eliminated as impossible, for by a process of elimination the correct theory may eventually be isolated.

I have added a note on the valuation of evidence which constitutes an attempt on my part to value some of the evidence as far as is possible by elementary mathematics, trying to free my estimate of value from bias, but as my valuation seems to be mainly in favour of my own theories readers may perhaps be pardoned if their first impression is that I have not quite succeeded. I hope their second impression will be that an attempt at mathematical valuation however crude is a step in the right direction in view of the many conflicting chronologies to some of which their authors do not hesitate to apply the word "certain."

It is perhaps as well to caution those who attach great weight to the spelling of proper names that they will find Thothmes III. spelt in many different ways in the following pages and other kings treated with the same disrespect! As I do not know which Egyptologist spells correctly I usually spell in the manner of the book which I am for the moment quoting, but sometimes in the manner which comes most easily to my pen. But whether spelt rightly or wrongly I think the kings to whom reference is made will always be recognised.

* * * * *

I may appear in my book to be particularly criticising Meyer's theories. This inevitably follows from the fact that my theories are opposed to his, but it is as well to record that without the assembling of facts by Meyer and Petrie and consideration of their theories the many other writers on Egyptian Chronology would have made little headway and my chief debt is also to these two. References in the text will show to what other writers I am particularly indebted, save that special mention must be made here of Schoch's *Planetentafeln*, on which my astronomical computations are based.

I must also express my direct obligation to Professor Sir Flinders Petrie, Professor Peet, Mr. Winlock, and Dr. Fotheringham, for answering queries put to them in correspondence. It need hardly be added that they are not responsible for any errors which I may have committed.

Readers must themselves judge how far I am right in my conclusions but I trust that even those who disagree with my theories and the dates assigned will find this book a useful compendium of facts bearing on the chronological problem.

DUNCAN MACNAUGHTON.

Edinburgh,
March, 1932.

CONTENTS.

LIST OF ILLUSTRATIONS.

ABBREVIATIONS.

A.	*The Academy.*
AC.	Merrit's *Athenian Calendar in the Fifth Century*, 1928.
AE.	*Ancient Egypt.*
AG.	*Annales du Musée Guimet.*
AJ.	*American Journal of Archæology.*
AM.	Archibald's *Mathematics before the Greeks*, 1929.
AO.	*Journal of the American Oriental Society.*
AZ.	*Zeitschrift für aegyptische Sprache.*
BA.	Borchardt's *Annalen*, 1917.
BB.	Books on Egypt and Chaldæa: Budge, 1902.
BD.	Burrows' *The Discoveries in Crete*, 1907.
BE.	Baikie's *History of Egypt*, 1929.
BG.	Beloch's *Griechische Geschichte*, 1927.
BGE.	Budge's *The Gods of the Egyptians*, 1903.
BGH.	Brugsch's *Grammaire Hieroglyphique*, 1872.
BH.	Brugsch's *History of Egypt* (trans. Seymour), 1879.
BI.	Biot's *Recherches sur plusieurs points de l'Astronomie Egyptienne*, 1823.
BL.	Brugsch's *Recueil*, 1862.
BM.	Brugsch's *Matériaux*, 1864.
BMM.	Budge's *The Mummy*, 1893.
BQ.	*British Museum Quarterly.*
BR.	Breasted's *Records*, 1906.
BRH.	Breasted's *History*, 1906.
BS.	Budge's *Short History of the Egyptian People*, 1914.
BT.	Brugsch's *Thesaurus.*
BU.	Bunsen's *Egypt's Place in Universal History*, 1848-67.
C.	Censorinus' *Liber de die natali . ., etc.* Lugd. Batav., 1743.
CA.	*The Cambridge Ancient History.*
CF.	Cory's *Ancient Fragments* (Hodges), 1926.

CR. *The Classical Review.*
D. Duncker's *History of Antiquity*, 1879.
E. Eusebius' *Chronica.* Ed. Schoene.
EB. *Encyclopædia Britannica.* (14th Edition.)
EE. Eadie's *Early Oriental History*, 1852.
EP. Evans' *Palace of Minos.*
FF. Frazer's *Ovid's Fasti*, 1929.
FH. Flugel's *History of the Arabs.* (2nd Edition.)
FN. *Festival Hall of Osorkon II.:* Naville, 1892.
FT. *Fayum Towns:* Grenfell, Hunt, and Hogarth.
GB. Griffith's *El Berseh*, 1894.
GH. Ginzel's *Handbuch der Chronologie*, 1906.
GP. *Greenfield Papyrus:* Budge, 1912.
H. Articles by H. Bruce Hannah in *Journal of Department of Letters* (Calcutta University Press), Vols. I.-XV.
HA. Hall's *Ancient History of the Near East*, 1924.
HM. Manilius' *Astronomicon.* Ed. Housman, 1903-30.
HP. *Hieraconpolis* (Brit. School of Archæology).
HS. Hall's *A Season's Work at Ur*, 1930.
I. Ideler's *Handbuch der Chronologie*, 1825-26.
JA. *Journal of the Royal Anthropological Institute.*
JEA. *Journal of Egyptian Archæology.*
JH. *Journal of Hellenic Studies.*
KC. Kenyon's *Catalogue of Greek Papyri*, 1893.
KS. King's *History of Sumer and Akkad*, 1910.
KU. Kugler's *Sternkunde in Babel*, 1907-10.
LC. Lepsius' *Chronologie der Aegypter*, 1849.
LD. Lepsius' *Denkmäler*, 1849-74.
LF. Langdon and Fotheringham's *Venus Tablets of Ammizaduga*, 1928.
M. Moret's *Nile and Egyptian Civilization*, 1927 (trans.).
MA. Meyer's *Aegyptische Chronologie*, 1904.
MB. Macnaughton's *A Scheme of Babylonian Chronology*, 1930.
MC. Meyer's *Altere Chronologie Babyloniens, Assyriens und Aegyptens*, 1925.
MD. Maspero's *Dawn of Civilization*, 1894.

ME.	Maspero's *New Light on Ancient Egypt* (trans. Lee), 1909.
MG.	Meyer's *Geschichte des Altertums*, 1909-31.
MM.	*Bulletin of the Metropolitan Museum of Art*: Section II.
NE.	Nicklin's *Studies in Egyptian Chronology*, 1928-29.
NS.	Newberry's *Scarabs*.
OLZ.	*Orient Litteratur Zeitung*.
OP.	*Oxyrhyncus Papyri*: Grenfell and Hunt.
P.	Ptolemy's *Tetrabiblos* (trans. Ashmand), 1917.
PA.	Petrie's *Athribis*, 1908.
PD.	Petrie's *Denderah*, 1900.
PE.	Petrie's *History of Egypt*, 1923.
PN.	Pendlebury's *Aegyptiaca*, 1930.
PP.	Proctor's *Great Pyramid*, 1883.
PS.	Petrie's *Historical Studies*, 1911.
RB.	Rice's *Byzantine Glazed Pottery*, 1930.
RE.	Rhind's *Egypt and its Climate*, 1856.
SA.	Smith's *Early History of Assyria*, 1928.
SB.	Boll's *Sphaera*, 1903.
SD.	Syncellus' *Chronographia*. Ed. Dindorff.
SE.	Sayce's *Egypt of the Hebrews*.
SG.	Scharff's *Grundzüge d. Aegyptische Vorgeschichte*, 1927.
SM.	Stewart's *Mystery of the Great Pyramid*, 1929.
TA.	Tofften's *Ancient Chronology*, 1907.
TB.	*Tebtunis Papyri*: Grenfell, Hunt and Goodspeed.
TM.	Torr's *Memphis and Mycenae*, 1896.
TR.	Thompson's *Reports of the Magicians and Astrologers of Nineveh and Babylon*, 1900.
WA.	Wilkinson's *Ancient Egyptians*.
WC.	Weill's *Chronologie Egyptienne*, 1926.
WE.	Waddell's *Egyptian Civilization*, 1930.
WH.	Weigall's *History of the Pharaohs*, 1925.
WS.	Wooley's *Sumerians*.
WU.	Wooley's *Ur of the Chaldees*, 1929.
ZS.	Zinner's *Geschichte der Sternkunde*, 1931.

INTRODUCTION.

ARCHÆOLOGY, history, and chronology, are different branches of study, but they are closely interrelated. No archæologist or historian can afford to neglect chronology entirely: yet it is possible to make a deep study of archæology with little knowledge of dates and to write a history showing intimate acquaintance with the habits of ancient peoples without knowing the precise date to which these peoples are to be assigned. But just as a doctor's training is incomplete without a knowledge of anatomy, so the knowledge of ancient peoples must be regarded as very limited if the proportions of the skeleton of their history are imperfectly understood.

There are clues to the chronology of Egypt which make it possible to frame theories as to what its chronology really was, and the following up of these clues and the piecing together of the evidence forms a much more fascinating occupation than the piecing together of a jigsaw puzzle. But there is no judge to say who is right and though fully twenty eminent Egyptologists have each proposed a different series of dates, none of the resulting chronologies is such as to command general acceptance. This does not necessarily imply that Egyptologists are unscientific as one confident critic (WE.) ventures to assert but that the evidence on which their conclusions are based admits of varying interpretations. The greatest discrepancies arise in the estimates of the intervals between the Sixth and Twelfth Dynasties and between the Twelfth and Eighteenth, while the estimates of the date of

commencement of the Eighteenth Dynasty vary by a little over 100 years. It is desirable, therefore, to review the history of Egyptian chronology and to note the dates assigned to the beginning of the First, Sixth, Twelfth, and Eighteenth Dynasties.

The earliest chronology which has come down to us is that of Herodotus[4] (c. 484-424), who tells us that from Menes to Sethos, priest of Vulcan (perhaps equivalent to Sebichos, 716-702 B.C.), was 341 generations which he estimated at 11,340 years (II. 142.) He claimed to have obtained the figure 341 from the Egyptian priests, but the total of years is his own calculation on the assumption that each king was the natural son of his predecessor, though he was merely figuratively so. Herodotus added that the sun "had within this period of time on four several occasions moved from his wonted course, twice rising where he now sets and twice setting where he now rises." Herodotus did not understand this but it is probably a reference by the priests to the change in position of the Wandering Calendar, for on four occasions prior to that time the 1st of Hathor (Spica's month) had coincided with the heliacal rising of Spica.

The next contribution to the chronology is that of Hecataeus, of Abdera, who in the time of Ptolemy Soter (c. 305-285) travelled up the Nile to Thebes to gather material for his History of Egypt (BE. 85) which is possibly partly drawn upon in the chronology of Diodorus, who stated after visiting Egypt *c.* 60-56 B.C. that for more than 4700 years kings, mostly natives, had ruled. He assigned 470 native kings, 4 Ethiopian kings, and 5 queens, to the interval from Menes to the Persian Conquest.

About the same time (as Hecataeus) or a little later the Egyptian priest Manetho by order of the king wrote a history in Greek. His list of dynasties[5] and kings,

preserved with variations in the copies of Josephus (*c.* 37-95 A.D.), Africanus (221 A.D.), and Eusebius (*c.* 264-340 A.D.) has formed the basis of all modern chronologies. Even those who subtract 2000 years from the date of Menes given by him are agreed that where his list can be checked by monuments it is substantially accurate, names being transposed or lengths of reign wrongly stated only occasionally. Manetho divided the period from Menes to the end of the Thirtieth (342 B.C.) or Thirty-first (332 or 331 B.C.) Dynasty into three sections to which he assigned totals of 2300, 2121, and 1050 years, making thus a combined total of 5471 years, yielding a date of 5813 B.C., or a little later for Menes. There are, however, discrepancies between his totals and his figures for the Dynasties so that this is only approximately correct. Duncker, for example, taking the figures for separate Dynasties and totalling them, states Manetho's estimate of the period as 5366 years and Manetho's date for Menes as 5706 B.C.

Georgius Syncellus (*c.* 800 A.D.) copied the chronologies of Africanus and Eusebius, and his chronography is a useful work of reference. Many similar chronologies were written between that date and 1800.

After Napoleon's expedition to Egypt in 1798 a new interest in Egyptian history and chronology was aroused which eventually led to practical results in the researches of Champollion (1791-1832), who in 1828-30 conducted the scientific expedition to Egypt which brought back many examples of Egyptian monuments. With the aid of the hypotheses for interpretation of the hieroglyphics already put forward in 1818 by Dr. Thomas Young of Somersetshire as a result of his study of the bilingual inscription on the Rosetta Stone, Champollion was able to open up a new source of knowledge of Egyptian history, the reading of inscriptions. Many have been discovered since his day

giving names of kings and dates in their reigns which show that the kings in question must at least have reigned up to the number of regnal years mentioned in their inscriptions. Other inscriptions make clear which kings preceded or followed certain kings and in many other ways assist in elucidating the chronology.

Of special importance was the discovery (by Dumichen in 1864) of a carefully compiled king list, the Abydos List inscribed by Seti I. (1450-1395) on a wall of the temple of Abydos and (at a later date) of the Sakkarah List inscribed in the tomb of a man Thunuroy who was buried in the reign of Seti's successor Ramses II. (1394-1328). There are gaps in these lists but portions of them tally very closely with the lists of Manetho. Lengths of reign are not given. Of slightly less importance is the Karnak List[2a] which gives the names of 61 kings prior to Thothmes III.

Still another king list[3] was discovered on an old papyrus. It contained not only the kings' names but their lengths of reign and ages at death. It was sent by the king of Sardinia to Turin, but arrived at its destination in hundreds of fragments. These were pieced together in 1826 according to Seyfarth's ideas, but the correct relative positions of many of the fragments is still a matter of conjecture. This list was probably written somewhat earlier than the Abydos and Sakkarah Lists, perhaps even as early as the beginning of the Seventeenth Dynasty (23rd century B.C.).

The study of Egyptian chronology was further advanced by Lepsius (1810-1884), who conducted an expedition to Egypt in 1842-45. He, following Ideler, directed attention to the Sothiac Cycle and astronomical evidence, his *Chronologie* 1849 and *Denkmäler* 1859 being his most important contributions to this aspect of the problem (the latter in addition containing a vast amount of matter bearing on other

branches of Egyptology). This branch of study was later taken up in detail by Mahler, Borchardt, Meyer, and Weill (and others).

The visits of the Scots antiquarian, Rhind (1833-63), to Egypt in 1856 and 1862, mark an advance along a different line. Hitherto archæology was mainly occupied with monuments on the surface, though excavation had already commenced under Mariette. Rhind insisted on the necessity of applying the methods of commonsense in the archæological field, careful recording of the situations in which objects were found, and cataloguing of all objects, however unimportant they might at first sight appear. But it was not till 1883, when serious work was begun by Petrie, that a new era opened up. Petrie put Rhind's maxims into practice and has unquestionably made a greater contribution to archæology than any other living man. Sequence dating, based on the relative depths at which objects were found, combined with an ever-increasing knowledge of the types of articles in use at different parts of the sequence, revolutionised the study of Egyptian arts and crafts. But Petrie is much more than a mere digger and classifier. He has all the time had a keen eye for anything bearing on the chronology, and in the numerous books and articles from his pen almost every item of chronological importance is fully considered, and theories propounded to explain difficult problems.

While scientific research was going on apace a peasant woman was, in 1887, hunting in a ruined town 180 miles south of Cairo for antiquities to sell to tourists. She found some clay tablets which proved to be the first specimens of the now famous Tel-el-Amarna tablets. They were written in the Babylonian cuneiform script and contained correspondence passing between Amenophis III. and other Egyptian kings and kings of Babylonia, thus yielding

synchronisms[2] by which the chronologies of the two countries could support each other.

Most important of all, in 1901 Maspero recognised on a fragment of stone,[3] now at Palermo, the annals of some of the earliest kings. These contain astronomical evidence of considerable value.

It may be well at this point to pause in order that we may get a general idea of how discovery has altered views as to date by tabulating various estimates of the dates of the First, Sixth, Twelfth, and Eighteenth Dynasties, keeping in view, however, that none of these estimates ever gained universal acceptance, and that as recently as 1914, Budge made the comment, "At the present time the dates proposed by Egyptologists for the reign of Menes are 5869, 5702, 5613, 5004, 4400, and 3315 B.C. . . . the earliest date that has been proposed by any Egyptologist is in my opinion far more likely to be correct than such a date as 3315 B.C."

	I. Dyn.	*VI. Dyn.*	*XII. Dyn.*	*XVIII. Dyn.*
Manetho (3rd cent. B.C.)	*c.* 5700	*c.* 4300	*c.* 3400	*c.* 1700
Wilkinson (1836) . .	2320	—	—	1573
Champollion-Figeac (1839)	5867	4426	3703	1822
Böckh (1845) . .	5702	4402	3404	1655
Lepsius (1858) . .	3892	2744	2380	1591
Unger (1867) . .	5613	4310	3315	1796
Mariette (1876) . .	5004	3703	3021	1703
Brugsch (1877) . .	4400	3300	2466	1700
Meyer (1887) . .	3180	2530	2130	1530
Petrie (1894) . .	4777	3503	2778	1587
Meyer (1904-08) . .	3315	2540	2000	1580
Sethe (1905) . .	3360	2480	2000	1580
Breasted (1906) . .	3400	2625	2000	1580
Petrie (1906) . .	5510	4206	3459	1580
Self (1929) . .	5598	4151	3398	1709
Petrie (1929) . .	4553	3282	2586	1587
Self (now) . . .	5776	4360	3373	1709

It is strange to see that Wilkinson placed Menes as low as 2320, but it is to be remembered that in 1836 English-speaking scholars were still under the hypnotic influence of Usher's Biblical Chronology. The dates

printed in the Bible were regarded as sacred, and it was positively wicked to disregard them. Thus the World was created in 4004 B.C., the Flood was in 2348, and the races of to-day were all supposed to be derived from Shem, Ham, and Japheth. Misraim, the son of Ham, was identified with Menes, and hence the date 2320. European scholars were not all tied to Usher, but with the exception of the French they were still dominated by the Misraim-Menes equivalence believed in by Syncellus over 1000 years before, and the idea that the Creation of Man was a recent event. Lepsius' low date of 3892 (as late as 1858) was probably unconsciously partly under the same influence, since Eadie in 1852 gave the date as 2750, "thus affording abundance of interval between the Flood and Menes" (EE. 77), clearly not supposing that anyone would question his premiss that Menes was later than the Biblical Flood (though he places it earlier than Usher had done).

As recently as 1928 we find a writer appealing to Dionysius of Tell Mahre and Bar Hebraeus to support him in his belief that Abraham was contemporary with Senousrit III. (NE. I. 43), though the same writer objects (NE. II. 4) to another who "goes the whole hog" and questions the possibility of a date before 4004 B.C. (H. I. 123), placing the commencement of Menes' reign in 2907 (H. XI. 6).

Another type of argument for lowering the date of Menes has been found by an industrious theorist who neglects all evidence except that of names and script, and regards Menes as identical[8] with Manishtusu of Akkad (WE. 156), and as founding the First Dynasty in 2703 B.C. He further informs us that Menes also ruled Crete, being the same person as Minos, and that he died in Ireland and was buried on the top of Knockmany in County Tyrone.

As Menes' date was made low by Wilkinson and Lepsius, Manetho's later dynasties had somehow to be

crushed into the intervening space. Hence the Eighteenth Dynasty was reduced to 1575 or 1591.

But Mariette, like Champollion, Böckh, and Unger, respected the information obtained from Manetho, which was in part already verified from inscriptions. Then came Meyer to dominate Egyptologists. His 1887 chronology shows that he was already prejudiced in favour of a "short" chronology at that time (though it is only fair to note that he regarded the dates then given as *minimum* dates). Later, after Mahler's discussion of the Ebers Calendar and date of Amenhotep I. (in 1894, AZ. XXXII. 104), and Borchardt's discussion of the date of rising of the Sothis in the 7th year of Senousrit III. (in 1899, AZ. XXXVII. 89), he accepted the view that the Sothis there mentioned was Sirius, from which it followed inevitably that the date for the Twelfth Dynasty should be placed over 1000 years later than Mariette's figure, and the Eighteenth Dynasty date reduced over 100 years.

(Following the arguments of Borchardt (BA.) and the lowering of the date for the First Dynasty by Meyer himself in 1925 (MC. 68) Scharff in 1927 carried the Sirius-Sothiac theory one stage further and dated the invention of the 365 day calendar *c.* 2781-2778 B.C., from which it followed, since that calendar was known before the Fourth Dynasty, that this Dynasty must be later (SG. 54-55). He suggested that it was invented by Imhotep in Zoser's reign and that the First Dynasty began later than 3200 B.C.)

Synchronisms with Babylonia having been obtained, as we have noted, from the Tel-el-Amarna Tablets, Assyriologists who already had been inclined to lower their dates owing to confusing Shagashalti-Buriash with Burnaburiash (MB. 54), reduced their date of Burnaburiash III. by 100 years to tally with the chronology of the Eighteenth

Dynasty. Later on some Egyptologists, not knowing or forgetting that this was how the date of Burnaburiash was arrived at, said that the low date for the Eighteenth Dynasty must be right since it synchronised with the dates arrived at by Assyriologists, thus reasoning in a circle.

Breasted, accepting Meyer's arguments, drew up an elaborate chronology based on the minimum lengths of reign of the kings and Dynasties as shown from monuments. On reading his chronology one is left with the impression that he regards a minimum date as likely to be the correct date. Such a conclusion is contrary to all the laws of probability. To say that if by chance excavation has only revealed one or two monuments from a king's reign and the latest of these happens to be dated in his *n*th year, therefore that king did not reign more than *n* years, is to say what may possibly be correct in regard to some of the kings, but is extremely unlikely to be correct in the case of all the kings. He was following again the method of Torr, who, on the monumental evidence available in 1892, deduced a minimum date of 1500 B.C. for the beginning of the Twelfth Dynasty (TM., 51). If he had stopped there and been content to call the date a minimum his reasoning would have been sound, but he regarded the minimum as the "safest" date (TM. viii.), though he admitted that an earlier date was perhaps possible. On theoretic grounds the illogicality of the method is obvious and the many discoveries since 1892 have demonstrated the manifest absurdity of Torr's conclusions. It is therefore strange that so able a scholar as Breasted should have stumbled into the same type of pitfall. Nevertheless his chronological discussions are very valuable provided it is kept in mind that what he really is demonstrating are the minimum dates, not the probable dates.

Petrie, with a knowledge of the practical difficulties

in the way of Meyer's theory, proposed an extra Sothiac cycle between the Twelfth and Eighteenth Dynasties, but this, though ingenious, is untenable with Sirius as Sothis, for it gave too long an interval and pushed back the early dynasties to a time anterior to the date of introduction of the calendar according to the Sirius theory. Yet the Palermo Stone clearly showed the existence of the 365 day year by at least the time of the Second Dynasty. What Petrie emphasized, however, was the complete incompatibility of Meyer's theory with the archæological evidence and the evidence of the King Lists.

But as the outstanding Egyptologists with a chronological bent—Breasted, Meyer, Petrie, and Weill—were three in favour of a form of "short" chronology and one in favour of a "long" chronology, it is perhaps not surprising that those who had not time to study the chronological problem for themselves gave their vote for the "short" chronology.

Budge, however, refused to accept the "short" chronology and, later, Hall thought he would effect a compromise by choosing a date for the Twelfth Dynasty intermediate between that of Meyer and of Petrie. He regarded the changes in art between the Twelfth and Eighteenth Dynasties as unlikely to have occupied so short an interval as 200 years or so long an interval as 1600 or 1700, and he entirely abandoned the Sothiac cycle as a clue to the period elapsed.

Petrie has now also abandoned the Sothiac cycle and substituted a theory that the dates of the Twelfth Dynasty were quoted in terms of a seasonal calendar. On cultural grounds, more particularly basing his conclusions on the variations in the types of Hyksos scarabs recently discovered by him, he now estimates the interval at about 800 years.

Baikie, who has evidently made a special study of the

artistic side of Egyptian life, thinks that arguments based on estimates of length of time for a change to have taken place in the arts of a nation are based on a slender foundation and that on cultural grounds a "long" chronology is just as likely to be right as a "short" chronology.

Weigall favours a short chronology but is evidently conscious that to a reader new to the subject the crushing of the Thirteenth, Fourteenth, Fifteenth, Sixteenth, and Seventeenth Dynasties into two or three hundred years will appear somewhat ridiculous. He therefore excuses himself by explaining that "of course the most important argument in favour of my arrangement is that the Thirteenth, Fourteenth, and Fifteenth Dynasties have got to be fitted into the period between the astronomically fixed date of the fall of the Twelfth Dynasty and the rise of the Seventeenth" (WH. II. 140). As the Twelfth Dynasty is not astronomically fixed where he thinks it is the necessity for the squeezing of the evidence disappears.

My own view, based principally on astronomical evidence, calendrical evidence, the evidence of the King Lists, and synchronisms with Babylonia, is that the interval from the end of the Twelfth Dynasty to the beginning of the Eighteenth Dynasty was somewhat less than 1500 years. The facts and theories adduced by me in support of this view are discussed in detail in the notes which follow my chronology.

EGYPTIAN CHRONOLOGY.

5782-5776 Six Kingless Years[2]

FIRST DYNASTY.[3]

	According to Eratosthenes		Abydos List	Monuments
5776-5714	Menes[4]	62	Menes	
5714-5687	Athothes[5]	59 (?27)	Atoti	Zet-Ata
5687-5658	Athothes	32 (?29)	Atoti	
5658-5639	Diabies (son of Athothes)	19	Atoti	
5639-5621	Pemphos	18	Hesapti	
5621-5612	Tegar Amachus	79 (?9)	Miebis	Tahuti-mer
5612-5606	Stichus (called Mars)	6	S.......	
5606-5576	Gosormies	30	Quebhu	Ka-ap
5576-5550	Mares Heliodorus	26	Bazau	Nor-mer[6]

SECOND DYNASTY.[7]

		Manetho		Sakkara or Abydos List	Turin	
5595-5566	Kenkenes[1]	(?29)	A 31 E 39	Kekau		
5566-5537	—	(29+)		Benoteren[8]		Udy
5537-5478	—	(?59)		Uznas		
5478-5468	—			Sendi		Semerkhet[9]
5467-5444	[11]Onenophes[9]		23	Neferkere		
5444-5436	—	(8)		Neferkesokar	8y. 3m.	
5436-5415	Ousaphais	(?21)	20	Huzefa	11y. 8m.	
5415-5389	Miebis		26	Bebti	27y. 2m.	Azab-Merpaba
5389-5371	Semempses[14]		18	Zazai		Semti
5371-5345	Bienneches		26	Nebka	19y.	Ra Neb

THIRD DYNASTY.[10]

	(*Africanus* "*Second*")		*Sakkara or Abydos List*	*Turin*	*Monuments*
5345-5307	Boethus[8]	38	Zoser		Zer-ta
	(Sirius)		Zoser Atoti		Zet-Ata
5307-5268	Kaiechos	39			Hetep-Sekhemui
5268-5221	Binothris[8]	47			Neteren
5221-5204	Tlas	19 (?17)			
5204-5163	Sethenes	41	Sezes		Uothnes
5163-5146	Chaires[8]	17			Sekhem-Ab
	(Chnubus Gnurus)				(Perabsen)
5146-5121	Nephercheres	25	Neferkere		
5129-5073	Sesochris	48		6y.	Khosekhem
5073-5043	Cheneres	30	Huni	24y.	Sa-Nekkht
		302			

FOURTH DYNASTY.[11]

	(*Africanus* "*Third*")				
5042-5014	Necherophes[12]	28			Nebka Ra
	(Ranosis)[8]				
5014-4985	Tosorthros	29			
4985-4978	Tyreis	7			
4978-4961	Mesochris[13]	17			Khosekhemui
4961-4945	Souphis[5]	16			
4945-4926	Tosertasis	19			Zeser Neterkhet
4926-4884	Aches	42			Khaba
4884-4854	Sephouris[8]	30	Snofru (I.)[20]	24y.	
	(Saophis Comatus)		Cheops (I.)	23y.	Khnum Khuf
4854-4828	Kerpheres	26	Dedefre	8y.	
			Chefren	? 1y.	
		214			

FIFTH DYNASTY.[18]

18 KINGS (EUSEBIUS' 17 RULED 448 YEARS).

	(*Africanus' "Fourth" and "Fifth."*)		*Sakkara or Abydos*	*Turin*	*Monuments*
4828-4818	(Missing King	10)			
4818-4789	Soris (Senraophis 2nd)[8]	29			Shaaru
4789-4726	Sufis[8]	63			Khufu[14]
4726-4660	Sufis	66			Khafre[15]
4660-4597+	Menkheres	63+	Menkheuhor		Menkaura
4627-4602	Rhatoises	25			Razedf
4602-4580	Bikheris (Biyris)[8]	22			
4580-4573	Seberkheres	7	Shepseskaf	4y.	Shepseskaf[8]
4573-4564	Thampfthis	9		2y.	
4564-4551	Userkheres (Moscherus[8] Heliodotus)	28	Userkaf[17]	7y.	Userkaf[18]
4551-4538	Sefres	13	Sahure	12y.	Sahura
4538-4518	Neferkeres	20	Nefererkere	x	Neferarkara
4518-4511	Sisires	7	Shepseskere	7	Shepseskara
4511-4491	Kheres[20]	20	Chaneferre	x	Nefer-f-ra
4491-4447	Rhathures	44	Neweserre	$30+x$	Raenuser
4447-4438	Menkheres II. (Musthis)[8]	9	Menkehor	8	Akauhor
4438-4394	Tankheres	44	Dedkere	28	Zedkara
4393-4360	Onnos	33	Unas	30	Unas

SIXTH DYNASTY.[28]

	Africanus		*Abydos List*	*Turin*
4360-4330	Othoes[29]	30	Atoti	x
			Userkere	?50
4330-4277	Phios[9]	53	Merire[30]	20
4277-4270	Methousouphis	7	Merenre[30]	
4276-4176	Phiops[9]	94	Neferkere	$90+x$
4176-4175	Menthesouphis	1	Mereure	1y. 1m.
4175-4163	Nitocris	12	Neterkere	

SEVENTH DYNASTY.[31]

	5 kings ruled 75 years (Armenian Version of Manetho)
4163-4088	" " " 75 years (Turin Papyrus)
	70 " " 70 days (Africanus)

EIGHTH DYNASTY.[31]

27 MEMPHITES RULED 146 YEARS, 4088-3942

	Frag. 48 Turin Papyrus	*Monuments*
4088	Neferkere	
	. . .	
	. . ndty	
4057	Acheseus Ocharus[9]	Uazkara

NINTH DYNASTY.[28]

19 Herakleopolitans ruled 409 years.

		Lists	*Monuments*
3942-c3922	1	Neitaqert (Turin fr. 43) (wife of Nictor, acc. to Eratosthenes)[8]	
c3922- 3902	2	Neferka "	
c3902- 3880	3	Neferes "	
c3880- 3850	4	Jeb "	
c3850- 3820	5	?	
c3820- 3801	6	?	
	7	?	
c3801- 3781	8	Neferkere (Turin fr. 64 and 67)	
c3781- 3761	9	Cheti (?Achthoes) "	
c3761- 3741	10	S . . h "	
c3741- 3735	11	. . . . "	
c3735- 3721	12	Senti "	
c3721- 3701	13	H . . "	
3701-c3670	14	Myrtaeus Ammonodotus[9] (acc to Eratosthenes)	
c3670- 3640	15	?	
c3640- 3617	16	?	Meryabra
c3617- 3587	17		Uahkara
c3587- 3537	18		Merykara
c3537- 3533	19		

TENTH DYNASTY.[illegible]

19 Herakleopolitans ruled 185 years.

	Abydos List		Monuments
3533-c3526	Menkere (Moeris)		
c3526- 3520	Neferkere		
c3520- 3512	Neferkere Nebi		Nebkaura
3512-c3491	Dedkere Shema (Thyesimares Robustus)[p]		
c3491- 3485	Neferkere Chendu		Neferkehor Neterben
c3485- 3457	Snefer-enkhre Pepi		
c3457- 3432	Merenhor		
c3432- 3414	Sneferka I.		
c3414- 3389	Nekere		
3389- 3380	Neferkere Tereru (Thirillus)[p]		
c3380- 3372	Neferkehor		
c3372- 3365	Neferkere Pepisenib		
c3365- 3357	Sneferka Anu	(Turin fr. 44 and 61)	
3357- 3355	. . . keure	2y.	
3355- 3351	Neferkeure	4y.	
3351- 3349	Neferkeuhor	2y.	
3349- 3348	Nefererkare	1y.	
		181	

ELEVENTH DYNASTY.

c3554-3504	Uahankh-Intef	50+x
c3504-3500	Nakhtneb-Tebnefer-Intef	x
c3500-3485	Senkhibtoui	14+x
c3485-3469	Nebheptre	x
c3469-3423	Nebhepura	46+x
3423-3409	Nebtouire	2+x
c3409-3389	Senkhkere	8+x

		Acc. to Africanus	Whole reign including coregencies
3389-3373	Amenemnes (Amenemhat I.)	16	3393-3363

TWELFTH DYNASTY.

				Turin Papyrus	
3373-3327	Sesonchosis (Senousrit I.)		46	45	3373-3327
3327-3299	Ammenemmes (II.)	(?28)	38	—	3331-3290
3299-3280	Sesostris (Senousrit)	(?19)	48	..9	3299-3280
3280-3242	Lachares (Senousrit III.)	(?38)	8	30+x	3280-3241
3242-3194	Ameres (Amenemhet III.)	(?48)	8	40+x	3242-3194
3194-3184	Ammenemmes (IV.)	(?10)	8	9y. 3.27.	3194-3184
3184-3180	Skemiophris (Sebekneferura)		4	3y.10.24.	3184-3180+

THIRTEENTH DYNASTY.[67]		HYKSOS KINGS.[69]	
	KINGS OF SOUTH EGYPT.		
	60 KINGS RULED 453 YEARS ACCORDING TO MANETHO.		
	Turin Papyrus *Frag. No. 72*		
3180-3142	Khutauira[68] *x* yrs. 3.24 (Chuter Taurus)	Ham (Khyan)[70]	c3188-3138
3142-3136	Sekhemkere 6 yrs.	Beisar	c3138-3130
c3136-3120	. . re . embet	Masr (Mizraim)	c3130-3110
c3120-3098	Sehotpeibre	Quft Ashmoun Atrib Sa (brothers)	c3130-3080
c3098-3076	Iufni		
c3076-3056	Senkhibre		
c3056-3054	Smenkere		
c3054-3052	Sehotpeibre[71]	Tudras, son of Sa	c3080-3060
c3052-3050	Nothemkere		
c3030-3046	— —	Maliq el Budsir	c3060-3040
	Frag. Nos. 76-80		
c3046-3043	Nothemibre	Hazaba	c3040-3020
c3043-3040	Sobkhotpere		
c3040-3037	Rensonb	Malia	c3020-2999
3037-3018	Fuibre Herwet (Meures Philoscorus)		

THIRTEENTH DYNASTY.[37]—(*continued*)

Frag. Nos. 76-80—(*continued*)

c3018-3010	Sethef-re
c3010-2965	Sekhemketouire
c2965-2960	User . . re
c2960-2943	. . kere Mermeshoi
c2943-2940	Hotpekere
c2940-2929	Kesetre
c2929-2908	Sekhemseuthtouire
2908-2896	Khesekhemre Neferhotpe (Chomoephta)[a]
2896-2886	Sihathorre
2886-2821	Kheneferre Sobkhotpe (An-Chunio-Sochus)[b]
c2821-2817	(? About 3 kings missing)
	Frag. No. 81
c2817-2813	Khehotpere
c2813-2802	Wahibre Ienib 10y. 8. 28
c2802-2778	Merneferre Ay 23y. 8. 18
c2778.2776	Marhotpere Ini 2y. 2. 9
c2776-2773	Senkhenre Se . . tu 3y. 2.
c2773-2770	Mersekhemre Retho 3y. 1.
c2770-2769	Seuthkere Heri 1y.
c2769-2767	Mernothemre 2y.
c2767-2727	(24 kings)

HYKSOS KINGS.[30]—(*continued*).

Tutis	35	2999-2964
Curudes (Kara)	63	2964-2901
Aristarchus (Anther)	34	2901-2867
Spanius	36	2867-2831
(Two names missing)	72	2831-2759
Serapis	23	2759-2736
Sesonchosis (Semqen)	49	2736-2687

FOURTEENTH DYNASTY.[77]

76 KINGS RULED 484 YEARS.

Turin Papyrus
Frag. No. 152

c2727-2726	(1 king)
c2726-2725	Inib
c2725-2723	Smerensobk
2723-2705	Pennsetinsept (Penteathyris)[9]
c2705-2624	(? 19 kings missing)

Frag. No. 126

c2624-2618	Sekhem . re
c2618-2612	Sekhem . . re
c2606-2600	Sese . . . re
c2600-2594	Nebirifure
c2594-2588	Nebirifure
c2588-2582	Smen . . re
2582-2520	Seusr . . . re (Sistosichermes)[9]
c2520-2461	(? 10 kings)

Frag. No. 108

c2461-2451	Seb . . re
2451-2400	[10]Men . . re[10] (Maris)[9]
c2400-2392	. . wahre
c2392-2324	(? 15 kings)

Frag. No. 101

c2324-2316	Sekheperure
c2316-2308	Dedkherure
c2308-2303	Senkhkere

HYKSOS KINGS.[80]—(*continued*).

Amenemnes (Aanebra)	29	2687-2658
Amasis	2	2658-2656
Acesephthres (Kheperra)	13	2656-2643
Achoreus (Aaqer)	9	2643-2634
Amesses	4	2634-2630
Chamois	12	2630-2618
Amesises	65	2618-2553
(1 king)	14	2553-2539
Use (Uazed)	50	2539-2489
Raneses	29	2489-2460
Ramessomenes	15	2460-2445
Thysimares (Maara)	31	2445-2414
Ramessesses	23	2414-2391
Ramessemes	19	2391-2372
Ramenes	39	2372-2333
Ramenes Vaphris	29	2333-2304
Concharis	6	2304-2298

FOURTEENTH DYNASTY.[57]—(*continued*).

c2303-2280	[9]Thetumre (? Timaios)	
c2280-2278	Sekhemre	
c2278-2276	Ke . . re	
c2276-2274	Neferibre	
c2274-2273	A . . re	
c2273-2272	Khe . . re	
c2272-2270	Enkhkere	
c2270-2266	Smen . . re	
c2266-2262	Mer . . re	
c2262-2252	(? 2 kings)	
	Frag. No. 97	
c2252-2248	Nehesire	
c2248-2244	Khethire	
2244-2243	Nebfure 1y. 5. 15.	

"SEVENTEENTH" (THEBAN) DYNASTY.[64]

(? 33 or 34 kings)

2243-2240	Sehebre	3y.
2240-2237	Merthneferre	3y.
2237-2236	Sonbkere	1y.
2236-2235	Hrunebtheferre	1y.
c2235-2223	Ubenre	
c2223-2211	. . .	
c2211-2200	. . .	
c2200-2188	. . thefere	
c2188-2175	Ubenre	
2175-2168	Fuibre (Phruron)[9]	
c2168-2160	Heribre	
c2160-2152	Nebsenre	
	. . .	
c2152-1709	(Other kings including Opehtiset Nubti c1800-1780+)	

(c1800-1780+Opehtiset[9] Nubti[60])

"FIFTEENTH DYNASTY."[58]

Silites (Sanati)[61]	19	2298-2279
Baeon (Bebnum)	44	2279-2235
Apachnas (Ypeqher)	36	2235-2199
Apophis (Aa-user-ra)	61	2199-2138
Sethos	50	2138-2088
Certus	29 or 44	2088-2045
Aseth (Shesha)[63]	24	2044-2020

"SIXTEENTH" DYNASTY.[64]

(? 1 king)	c2020-2000
(? Apophis 2nd)[71]	c2000-1970
(Other Hyksos kings subject to the Assyrians)[72]	

EIGHTEENTH DYNASTY.[39]

	Reign acc. to Josephus	Date of Accession			Reign including coregencies
Aahmes (Amos)[41]	25y. 4m.		1709		1709-1683+
Amenhotep[8] I. (Amenophis I.)[77]	20y. 7m.	(*c* Apr.)	1682		1682-1662+
Tahutmes I. (Chebron)	13y.	1st June	1662		1662-1628
Hatshepsut[40] (Sister of Amesses)[38]	21y. 9m.	21st Sept.	1650		1650-1600+
Tahutmes II. (Mephres)	12y. 9m.	(*c* 30th July)	1628		1628-1615
[38]Tahutmes[40] III. (Misfragmouthosis)[8]	35y. 10m.	2nd July	1615	2nd July	1615-15th May, 1561
Tahutmes IV. (Touthmosis)	9y. 8m.	(*c* August)	1579		1579-1569
Amenhotep[38] II. (Amenophis II.)[78]	30y. 10m.	(*c* June)	1569		1569-1538+
Amenhotep[39] III. (Horus)[48]	36y. 5m.	(*c* 23 August)	1538		1538-1501+
Akhenaten[8] (Achencherres)[43]	12y. 1m.	(*c* March)	1501		1501-1474+
Rasmenkhka (Rathos)	9y.	(*c* Nov.)	1489		1489-1480+
Tutankhamen (Chebres)	12y. 5m.	(*c* Sept.)	1480		1480-1468+
Ay (Acherres)	12y. 3m.	(*c* March)	1468		1468-1456+
Rameses I. (Ramesses)	1y. 4m.	(*c* Dec.)	1456		1456-1454
Horemheb (Armesis)	4y. 1m.	(*c* Jan.)	1454		1454-1395

NINETEENTH DYNASTY.[44]

		Period (excluding coregencies)
Seti I.[45]	51 (55)	1450-1395
Ramses II.[46]	66	1394-1328
[9]Merenptah[48]	20	1328-1308
Seti II.	60	1308-1277
Ramesses		1277-1248
Amenemmes	5	1248-1243
Tausert	7	1243-1236
Siptah	6	1236-1230
Setnekht		

[49]TWENTIETH DYNASTY.[51]

Ramses III.	(Usimare-Miamun)[49]	31	1230-1199
Ramses[9] IV.	(Hekmare-Setpenamun)[50]	6	1199-1193
Ramses V.	(Usimare-Sekhepereure)	4+x	1193-1173
Ramses VI.	(Nebmare-Miamun)[47]	4+x	
Ramses VII.	(Itamum-Neterhekon)	7+x	
Ramses VIII.	(Usimare-Akhenamen)	x	
Ramses IX.	(Neferkere-Setpenre, Khaemwese)	17+x	1173-1113
Ramses X.	(Khepermare-Setpenre)	3+x	
Ramses XI.	(Menmare-Setpenptah)	27+x	1113-1095+

TWENTY-FIRST DYNASTY.[50]

	Sothic Book	Africanus	Monuments	
Hrihor (Nephelcheres)	6	4	x	1095-1089
Nesubenebded / Akheperre-Pesibkhenno I. (Smendes)		26	17+x	1089-1062+
Paynozem I. (Psousennes)[51]	25	46	40+x	1062-1017
Amenemopet (Amenophthis)	9	9	49+x	1017-968
Siamon (Osochor)	15	6	16+x	968-952
Pesibkheno II. (Psinaches)	9	9	12+x	952-940
Paynozem II. (Psousennes)		14		940-926+

TWENTY-SECOND DYNASTY.[56]

	Total Reign	Date	Reign acc. to Manetho	Corresponding Date
Sheshonk I.[71]	21+x	940-906	21	926-905
Osorkon I.[71]	36+x	906-870	15	905-890
Takelot I.[52]	25+x	891-866		
Osorkon II.[53]	28+x	888-860	25	890-865
Sheshonk II.	0	c884		
Takelot II.[54]	25+x	865-840	13	865-852
Sheshonk III.[60]	53	884-831		
Pemou	6+x	832-826	42	852-810
Sheshonk IV.	37+x	840-803		

TWENTY-THIRD DYNASTY.[56]

Petoubastis			40	809-769
Osorcho			8	769-761
Psammous (Piankhi)[9]			10	761-751
Zet (So)[71]			31	751-720

TWENTY-FOURTH DYNASTY.[57]

Bocchoris			6	720-714

TWENTY-FIFTH DYNASTY.[58]

Sabakon (Shabaka)			12	714-702
Sebichos[20] (Shabataka)[9]			12	702-690
Tarkos (Taharka)[71]			18+	690-672+

TWENTY-SIXTH DYNASTY.[59]

			Africanus	
Stephinates			7	684-677
Nechepsos			6	677-671
Nechao			8	671-663
Psammetichus			54	663-609
Nechao 2nd[71]			(15)	609-594
Psammonthis			(6)	594-588
Ouaphris[9]			19	588-569
Amasis			44	569-525
Psammecherites			0y. 6m.	

		Manetho	*Date*
27th	Dynasty of Persians	120	c525-405
28th	Dynasty (Amyrtaeus)	6	c405-399
29th	Dynasty of Mendesians	21	c399-378
30th	Dynasty at Sebenytus	(38)	c378-342
31st	Dynasty of Persians		c342-332
32nd	Dynasty of Macedonians		
	Alexander the Great[61]		c332-323
	Ptolemy I, as Satrap of the Macedonian King		c323-305
33rd	Dynasty of Greeks[62]		
	Ptolemy I. Soter		c305-285
	Ptolemy II. Philadelphus[63]		285-246
	Ptolemy III. Euergetes[64]		246-220
	Ptolemy IV. Philopator		220-203
	Ptolemy V. Epiphanes		203-180
	Ptolemy VI. Philometor		180-145
	Ptolemy VII. Euergetes II.[65]		145-115
	Ptolemy VIII. Soter II, and Ptolemy IX.		115- 80
	Berenice and Ptolemy X. Alexander		80- 79
	Ptolemy XI. Dionysos Neos		79- 51
	Cleopatra		51- 30

NOTE 1. THE SOTHIAC CYCLE.

It is universally admitted that prior to the introduction of the Alexandrian[67] calendar fixed relatively to the Julian calendar, the Egyptians had a civil calendar of 365 days without any leap year, consisting of 12 months of 30 days each and 5 intercalary days. It has been suggested that the 365 day calendar was a late innovation but the 5 extra days are mentioned in the Pyramid Texts, and in a Fifth Dynasty text (WC. 63), so that the 365 day calendar was in use at least as early as that period and probably earlier. I have in another note given my views as to the existence from still earlier times of a calendar adjusted to the stars, retained as a sacred calendar[58] after the introduction of the 365 day civil calendar.

As the 365 day calendar falls short of the length of the sidereal year (the interval from the date of the heliacal rising of a star to the date of its next heliacal rising) it follows that the heliacal rising of any star did not take place on the same date each year, but gradually later and later in the calendar until after an interval of years it once more rose on the same date. This calendrical cycle is known as the Sothiac cycle.

As the Julian calendar contained 365 days with an extra day every fourth year, the difference between the Egyptian and the Julian calendar was one day in four years, so that after exactly $365 \times 4 = 1460$ Julian (or 1461 Egyptian) years a given date in the Egyptian wandering year would fall on the same Julian date as at the commencement of the period. The Julian year, however, differed slightly from the sidereal year and also from the seasonal

(the modern Gregorian) year. (It is, of course, to be borne in mind that the Julian year was not actually in use* till 46 B.C., being finally adjusted in A.D. 4, and that the Egyptian wandering year was finally abandoned in the third century A.D. except by a few who clung tenaciously to it, so that a complete cycle did not occur while both calendars were in use.)

The fact that a 365 day calendar was used is very useful in checking Egyptian chronology, for if we are told that a star rose on a certain date in the calendar we can tell the period of the cycle in which the date falls. At all times the Egyptians attached importance to the Isis-Sothis, Sirius, and in the late period regarded its rising as the commencement of the sidereal year. Their original Sothis, however, was Spica, the star from which both they and the Babylonians measured their zodiacs, and in the Calendar of Esneh[66] the day of its Rising is referred to as the Beginning of the Year of the Ancients. In the Athribis[68] Zodiac A, the old Sothic symbol of the star in the horns of the Hathor Cow is opposite the beginning of Libra, thus confirming the importance of this sign as the first sign of the zodiac and of Spica as the measuring star.

That Hathor (Libra rising) was the original first month of the fixed civil calendar is also indicated by references in old inscriptions to the New Year ceremonies. From these Brugsch deduced, according to Budge (BGE. i. 135) that "Sothis rose heliacally on the first day of the Egyptian New Year, and when the Sun-god Ra had entered his boat, Hathor, the goddess of the star Sothis, went with him and took up her place like a crown upon his forehead." Also, in the hymn to Ra in the *Book of the Dead*, the deceased officer Nekht says, "O thou beautiful being, thou dost

* The Athenians appear to have had three different calendars in the Fifth Century B.C., of which one consisted of 365¼ days (AC.).

renew thyself in thy season in the form of the Disk within thy mother Hathor," thus clearly showing that the original New Year began with Hathor, not Thoth.

Spica was also the measuring star* of the Babylonian zodiac under the name of 'Alulim,' after which the original first month ' Elul ' was named, and later under the name of ' Shupa ' " the glancing star, Queen of the Igigi." (MB. 4.25. 71. 75.)

The zodiac later used by the Greeks was apparently introduced by Cleostratus (JH. XXXIX. 167). Dr. Fotheringham says " from Babylon " but it was at least the Egyptian Signs which were used, save that owing to some verbal confusion the first sign when first introduced to Greece was called Chelae, " the claws " of Scorpio, whereas the Egyptians called the first sign the " Scales." The Greek and Roman zodiacs were later altered to conform with the Egyptian zodiac. By *πρῶτα σημεῖα* the Greeks referred to the first degrees of Scorpio (JH. XXXIX. 167). It is probable that this is really a reference to the beginning of the first sign, called the Scorpion's Claws (the constellation of that name having begun to rise within the period of rising of the first 30 degrees of the zodiac) and that they also measured their zodiac from Spica. The Romans attached great importance to the Rising of Spica in the later period, as is shown by Carcopino's explanation of Virgil's Messianic Eclogue.

If we know the position of the calendar on one given date, if the calendar was never altered, if observation of a star rising were made at different periods by persons with exactly the same strength of sight under the same atmospheric conditions, in the same latitude, we could deduce from the calendar date of every such observation within what 4 year period of a given Sothiac cycle the observation occurred.

* Even in the late period both Sirius and Spica were sometimes described in Babylonia as mul(il) BAN, " the bow star " or measuring star, the exact equivalent of the Egyptian term " Sothis." Thus Kugler says (KU. II. 87) " Es kann somit keinem Zweifel unterliegen dass Sirius und Spica denselben Namen mul(il) BAN ' Bogenstern ' führten."

We know with certainty the exact position of the calendar in the time of the Roman Empire from Greek Papyri[70] and we know from the comments of Censorinus[69] that in 139 A.D. 1st Thoth was equivalent to 20th July of the Julian calendar and that Sirius rose on 1st Thoth about that date. But there is evidence that the calendar was altered at various periods, the most important occasions being The Reform of Aseth,[53] the "Repeating of Births"[45] in the Reign of Seti I., the Reform at the Era of Menophres[46] or else on some date between that and 721 B.C.,[62] most probably 880 B.C.,[52] the Reform of Ptolemy III. Euergetes,[64] and the introduction of the Alexandrian Calendar[67] (though the Wandering Calendar persisted alongside of it). Variations of sight or of priestly calculations might make a difference of at least a day in the calendar date, and variations of latitude between north and south Egypt might make a difference of about 5 days in the observation of Sirius, but very little difference in the observation of Spica.

It follows that the use of the Sothiac Cycle alone will not enable us to assign very precise dates. When, however, other evidence is brought into account such as the Sed Festivals,[55] the conjunctions of Jupiter and Saturn,[9] the Feasts of the Appearance[11] of Amon, and lunar dates,[30] precise dates with a high degree of probability of accuracy can in some cases be assigned.

The following table shows the equivalence of some chronologically significant dates of the Egyptian calendar with dates of the Julian calendar, at the same time giving some dates of Rising of Spica.

In the period under review the date of Rising of Sirius in terms of the Julian calendar changed very slowly, and was throughout not far from 14th July near Thebes and Abydos, and not far from 19th July in Memphis and Alexandria.

Year.	Approx. Julian Date of Heliacal Rising of Spica.		Date of Egyptian Wandering Year.	Other Julian Equivalents.
5578	24th August	=	1st Hathor (1st month)	
			(19th Tekhi* (11th month)	= 13th July).
5459	24th ,,	=	1st Kaherka (2nd month)	
5342	25th ,,	=	1st Shefbedet (3rd month)	
5225	25th ,,	=	1st Rekeh, great (4th month)	
5108	26th ,,	=	1st Rekeh, little (5th month)	
4991	27th ,,	=	1st Renenouti (6th month)	
4874	28th ,,	=	1st Khonsou (7th month)	
4757	28th ,,	=	1st Khent Khat (8th month)	
4667	29th ,,	=	24th Khent Khat (8th month)	
4667			22nd Renenouti (6th month)	= 28th June.
4667			8th Tekhi (11th month)	= 11th Nov.
4640	29th ,,	=	1st Epet (9th month)	
4523	30th ,,	=	1st Re Hor Khouti (10th month)	
4406	31st ,,	=	1st Tekhi (11th month)	
4295	31st ,,	=	29th Tekhi (11th month)	
4289	31st ,,	=	1st Menkhet (12th month)	
4281			1st Hathor (1st month)	= 3rd Oct.
4176	1st September	=	30th Menkhet (12th month)	
4176			5th Epagomenal Day	= 6th Sept.
4176			1st Hathor (1st month)	= 7th ,,
4152	1st ,,	=	1st Hathor (1st month)	
4035	2nd ,,	=	1st Kaherka (2nd month)	
3918	3rd ,,	=	1st Shefbedet (3rd month)	
3801	3rd ,,	=	1st Rekeh, great (4th month)	
3684	4th ,,	=	1st Rekeh, little (5th month)	
3567	5th ,,	=	1st Renenouti (6th month)	
3450	6th ,,	=	1st Khonsou (7th month)	
3422	6th ,,	=	8th Khonsou (7th month)	
3422			3rd Kaherka (2nd month)	= 4th April.
3334	7th ,,	=	1st Khent Khat (8th month)	
3274	7th ,,	=	16th Khent Khat (8th month)	
3263			21st Khent Khat (8th month)	= 9th Sept.
3251			1st Hathor (1st month)	= 19th Jan.
3251			26th Re Hor Khouti (10th month)	= 10th Nov.
3220	8th ,,	=	1st Epet (9th month)	
3103	9th ,,	=	1st Re Hor Khouti (10th month)	
2987	10th ,,	=	1st Tekhi (11th month)	
2873	11th ,,	=	1st Menkhet (12th month)	
2756	12th ,,	=	1st Epagomenal Day	
2736	12th ,,	=	1st Hathor (1st month)	
2619	13th ,,	=	1st Kaherka (2nd month)	
2502	14th ,,	=	1st Shefbedet (3rd month)	
2385	14th ,,	=	1st Rekeh, great (4th month)	
2268	15th ,,	=	1st Rekeh, little (5th month)	
2151	16th ,,	=	1st Renenouti (6th month)	
2036	17th ,,	=	1st Khonsou (7th month)	
2035			26th Rekeh, great (4th month)	= 14th July.[n]
2035	17th ,,	=	1st Khonsou (7th month)	
2034			30th Tekhi (11th month)	= 13th Feb.

* In the 360 day year, omitting the epagomenae.

Year.	Approx. Julian Date of Heliacal Rising of Spica.	Date of Egyptian Wandering Year.	Other Julian Equivalents.
2034		1st Menkhet (1st month)	= 14th Feb.
2034		1st Rekeh, little (6th month)	= 14th July.
2034	17th September	= 6th Khonsou (8th month)	
1940	18th ,,	= 1st Khent Khat (9th month)	
1823	19th ,,	= 1st Epet (10th month)	
1707	20th ,,	= 1st Re Hor Khouti (11th month)	
1674	20th ,,	= 9th Re Hor Khouti (11th month)	
1662	20th ,,	= 12th Re Hor Khouti (11th month)	
1635	20th ,,	= 19th Re Hor Khouti (11th month)	
1614	20th ,,	= 24th Re Hor Khouti (11th month)	
1593		21st Khent Khat (9th month)	= 13th July.
1593	21st ,,	= 1st Tekhi (12th month)	
1584		30th Re Hor Khouti (11th month)	= 18th Sept.
1584	21st ,,	= 3rd Tekhi (12th month)	
1571	21st ,,	= 6th Tekhi (12th month)	
1571		2nd Renenouti (7th month)	= 20th April.
1569	21st ,,	= 7th Tekhi (12th month)	
1569		26th Khent Khat (9th month)	= 12th July.
1567		25th Re Hor Khouti (11th month)	= 9th Sept.
1567	21st ,,	= 7th Tekhi (12th month)	
1540	21st ,,	= 14th Tekhi (12th month)	
1495		13th Khonsou (8th month)	= 12th May.
1495	21st ,,	= 25th Tekhi (12th month)	
1470	21st ,,	= 1st Epagomenal Day	
1455	21st ,,	= 5th Epagomenal Day	
1454		20th Rekeh, little (6th month)	= 10th Mar.
1451	21st ,,	= 1st Menkhet (1st month)	
1448	21st ,,	= 2nd Menkhet (1st month)	
1433	21st ,,	= 6th Menkhet (1st month)	
1432		1st Re Hor Khouti (11th month)	= 13th July.
1432		1st Epagomenal Day	= 11th Sept.
1432		1st Epagomenal Day (repeated)*	= 16th Sept.
1432	21st ,,	= 1st Menkhet (1st month)	
1394	22nd ,,	= 11th Menkhet (1st month)	
1394		10th Re Hor Khouti (11th month)	= 18th July.
1358	22nd ,,	= 20th Menkhet (1st month)	
1331	23rd ,,	= 28th Menkhet (1st month)	
1318	23rd ,,	= 1st Hathor (2nd month)	
1318		1st Thoth (12th month)*	= 20th July.
1317		1st Thoth (12th month)	= 19th July
1297		1st Thoth (12th month)	= 14th July.
1230		26th Payni (9th month)	= 24th April.
1198	23rd ,,	= 1st Khoiak (3rd month)	
1197		1st Epagomenal Day	= 19th July.
1195	24th ,,	= 3rd Khoiak (3rd month)	
1163		19th Khoiak (3rd month)	= 2nd Oct.
1097	24th ,,	= 27th Khoiak (3rd month)	
1096		8th Thoth (12th month)	= 2nd June.
1086	25th ,,	= 1st Tybi (4th month)	
979		6th Re Hor Khouti (11th month)	= 1st April.
979	26th ,,	= 29th Tybi (4th month)	
971	26th ,,	= 1st Mekhir (5th month)	
881	27th ,,	= 25th Mekhir (5th month)	

Year.	*Approx. Julian Date of Heliacal Rising of Spica.*		*Date of Egyptian Wandering Year.*	*Other Julian Equivalents.*
880			20th Khoiak (4th month)	= 19th July.
880	27th September	=	1st Phamenoth (7th month)	
879			21st Khoiak (4th month)	= 19th July.
878			1st Thoth (1st month)[63]	= 31st Mar.
818			1st Tybi (5th month)	= 14th July.
760	27th ,,	=	1st Pharmouthi (8th month)	
721			29th Thoth (1st month)[64]	= 19th Mar.
720			18th Thoth (1st month)	= 8th Mar.
720			15th Phamenoth (7th month)	= 1st Sept.
698			1st Thoth (1st month)	= 14th Feb.
698			1st Mekhir (6th month)	= 14th July.
644	28th ,,	=	1st Pakhons (9th month)	
578			1st Phamenoth (7th month)	= 14th July.
524	28th ,,	=	1st Payni (10th month)	
458			1st Pharmouthi (8th month)	= 14th July.
408	29th ,,	=	1st Epiphi (11th month)	
338			1st Pakhons (9th month)	= 14th July.
288	29th ,,	=	1st Mesore (12th month)	
245	29th ,,	=	12th Mesore (12th month)	
245			27th Thoth (1st month)	= 18th Nov.
241			1st Payni (10th month)	= 19th July.
237			1st Payni (10th month)[66]	= 18th July.
217			1st Payni (north)	= 18th July.
217			1st Payni (south)	= 13th July.
172			1st Epagomenal Day (north)	= 7th Oct.
172	30th ,,	=	1st Epagomenal Day (south)	
152	30th ,,	=	1st Thoth (south)	
152			1st Thoth (north)	= 7th Oct.
118	30th ,,	=	9th Thoth (south)	
118			9th Thoth (north)	= 7th Oct.
117			26th Payni (south)	= 13th July.
B.C. 36	1st October	=	1st Phaophi (south)	
A.D. 5			1st Thoth (north)[67]	= 29th Aug.
5			1st Thoth (south)	= 22nd Aug.
A.D. 85	1st October	=	1st Athyr[70]	
139			1st Thoth[69]	= 20th July.
140			1st Thoth	= 19th July.
160			1st Thoth	= 14th July.

In the above table the months have been numbered 1 to 12 but in reality the Egyptians divided them into 3 seasons of 4 months each, Akhit, Pert, and Shema. There are differences of opinion both as to the pronunciation and meaning of the words, but it is generally supposed that, at least in the late period, the first season, Akhit, meant "flood season." It is clear, therefore, that when in its ideal position this period must have included the date of

high Nile, not only the mean date but the earliest and latest dates when it was likely to occur. An examination of the records of 32 years between 1798 and 1888 A.D. disclosed an earliest date of 25th August Gregorian and a latest of 27th October (BA. 7). The Flood Season would not begin therefore earlier than 4 months of 30 days (120 days) before 27th October Gregorian, *viz.* 29th June and may have begun later. This fact alone makes it impossible that the Rising of Sirius should have always been the starting point of the year, for it would preclude a date earlier than the 25th century B.C. for the introduction of the Calendar, since then even in North Egypt Sirius rose as early as 29th June Gregorian (=19th July Julian) and rose on 24th June in the South.

Brugsch collected a large amount of data bearing on the question of the time of the inundation, from which it is clear that the Nile began to rise slightly about the time of the Summer Solstice, but did not usually increase to any extent till the end of July (BM. 11 ff.), beginning of Mesore Alexandrian, (*καὶ Μεσορὶ Νείλοιο φέρει φυσίζοον ὕδωρ*) and commenced to decrease in the middle of November.

There is further the testimony of Pliny (BM. 13) in his *Historia Nat.* V. 10 §57: "(Nilus) incipit crescere luna nova quaecunque post solstitium est." Now the mean date of the first new moon after the Solstice would be 15 days after the Solstice, namely 7th July Gregorian. This evidence, it will be seen, supports the theory that the calendar originated in the 56th century B.C., when the Rising of Spica, corresponding to 1st Hathor, occurred about 24th August Julian, 11th July Gregorian, and that there were two reforms of seasonal grouping, necessitated by precession, first making the preceding star month Menkhet the first month, and later making Thoth the first month. If Thoth was made the first month in 880 B.C. and measured

from the Rising of Sirius in the North, 19th July Julian, 1st Thoth of the fixed calendar then corresponded to 11th July Gregorian, the same seasonal date with which the first day of the 365 day calendar coincided when it originated. The last day of the flood season would then be 7th November, later than the latest High Nile, but a date when the flood had subsided very little and was still very much higher than, for example, its heighth in the end of June.

NOTE 2. THE FIRST DYNASTY.

According to the Turin Papyrus[8] Menes commenced to reign 949 years before the end of the Fourth Dynasty (the third of Africanus). This yields the date 5776. The Palermo Stone[5] shows on the second line the end of one king's reign and beginning of another in 5714. If Menes' reign was 62 years, as stated also by Manetho, this would be the end of Menes' reign and beginning of that of Athothis I.

Africanus, one may suppose, had a torn copy of Manetho's list, not going further back than Onenophes of the Second Dynasty. He knew from other sources that there were three kings, Menes, Athothis and Kenkenes. He put them at the beginning of the Second (his First) Dynasty and gave them years to make up the total of the dynasty. Eratosthenes has also accepted 59 as the length of reign of Athothis I. But the Turin Papyrus (according to Weigall) shows a numeral ending in 7. Eusebius gave 27, which is possibly correct.

For Athothis II. the Turin Papyrus has a numeral ending in 9, so 29 is possibly the correct figure here. This is only partly corroborated by the Cairo Fragment[6] which shows in the second line the years 5655-5647, with a name Itti-Dr. above it. The name was possibly usually placed above the centre of a reign. It appears above the years 5652-50. This is not quite central for it implies 6 years to the right and 11 to the left of the name. Perhaps Diabies' reign was really 5 years shorter or there may have been another portion of the name further along.

The reign of Tegar Amachus cannot have been 79 for there is not room on the stone for that.

About 181 years from Menes,[4] namely in 5595, though this dynasty continued a little longer,[5] Kenkenes of the Second Dynasty became supreme.

The end of the reign of Mares Heliodorus falls in that of Benoteren of the Second Dynasty, who was called Udi (" the overthrower," acc. to Weigall) on the Palermo Stone. It would be Udi who caused the final downfall of this dynasty after the death of Mares. Mares may be the king whose name occurs on monuments as Mer, with the Horus name provisionally read as Nor (AG. XXV. 67). He had reasserted the supremacy of his dynasty as shown on his state palette. For some reason he has been identified with Menes by some Egyptologists.

NOTE 3. THE TURIN PAPYRUS AND MANETHO.

The papyrus now known as the "Turin Papyrus" originally formed part of the collection made in Egypt by M. Drovetti, the French Consul-General there. It was offered for sale to the French Government, who declined it. It was then bought by the King of Sardinia, and eventually was sent to Turin, where it arrived broken in transit into hundreds of fragments (BB. IX. 115). Champollion-le-Jeune recognised its importance in 1824 and collected about 160 to 180 royal names from the fragments. In 1826 Seyfarth pieced it together, but his "restoration" was early seen to be faulty by Rosellini, Birch, and de Rougé. Champollion Figeac drew special attention to the fact that the fibres were not in alignment.

Many scholars have since tried to fit the fragments together, and the names of kings on 400 of them are now recognisable as belonging to kings of specific dynasties. Borchardt has lately reproduced and discussed some of the fragments of which the position is doubtful (BA.). It is evident that if the list had been intact it would have been very valuable for chronology.

It apparently was a list extending from before the time of Menes to the end of the Seventeenth Dynasty. Opposite each king's name were his years of reign and age at death, and at intervals the number of kings and number of years since Menes were totalled.

Where kings can be identified with kings in Manetho's list the number of years of reign does not always agree. But this is not necessarily due to error in either list, for

coregencies were common. Thus, in the Sixth Dynasty[19] Manetho has Pepi I. 53 years, and Methusfis 7, while the Turin Papyrus accords them only 20 years and 4 years respectively, but the Papyrus had an extra king before Pepi (whose name we may supply from the Abydos list as Userkere), whose regnal years cannot be deciphered. Pepi may have been coregent with Methusfis during his first 3 years and Userkere coregent with Pepi during his first 36 years: for it is probable from the record of a 25th census (biennial) that he reigned at least 50 years. Africanus is in error however in omitting Userkere.

A most important fragment of the papyrus contains a summary as follows (acc. to Weigall): "181 years 6 months 3 days. Kingless years 6. Total (187 years 6 months 3 days). Kings since Menes, their kingdoms and years and the kingless years (94)9 years 15 days, kingless years 6. Total 955 years."

Now Manetho's totals of dynasties where they can be checked from the Eighteenth Dynasty onwards have in no case, with the possible exception of the Twenty-first Dynasty, shown an error of more than 10 per cent. of the correct length of the dynasty (discounting coregencies) and have usually been correct almost to the year. The probability that Manetho is correct in his early dynasty lengths may therefore be stated by ·9. This is far removed from certainty and can easily be overthrown by stronger evidence, but it cannot be overthrown by the opinion "I cannot believe the period was so long."

In order therefore that we may see approximately after which dynasty this fragment comes we may compare the dynasty totals stated in the versions of Manetho given by Africanus and Eusebius for the early period. (The additions in brackets are of course entered for comparison and do not occur in the originals.)

Dynasty of Africanus	*Total*	*Combined Total*	*Dynasty of Eusebius*	*Total*	*Combined Total*
" First " of 8 Thinites	253		" First " of 8 Thinites	252	
" Second " of 9 Thinites	302	(555)	" Second " of 9 kings	297	(549)
" Third " of 9 Memphites	214	(769)	" Third " of 8 Memphites	198	(747)
" Fourth " of 8 Memphites	277				
" Fifth " of Elephantine kings	248	(1294)	" Fourth " of 17 Memphites	448	(1195)
Sixth of 6 Memphites	203	(1497)	" Fifth "	203	(1398)
Seventh 70 days			Seventh 70 days		

Now Eusebius' Fourth is the same as Africanus' Fourth and Fifth together for he begins his Fifth with Othoes, with whom Africanus begins his Sixth. Further there is contemporary evidence to show that Eusebius was more nearly correct in assigning 448 years to this period than Africanus who assigns 525 years. But it will be seen that Eusebius has no Sixth Dynasty. Africanus and Eusebius may both have been using an imperfect copy of Manetho with one dynasty missing. Africanus seeing the omission split the " Fourth " into the Fourth and Fifth: but as comparison with the Abydos list and the astronomical evidence on the Palermo Stone shows[5] it was in the First Dynasty itself that a dynasty was lost, since there were really two dynasties from Menes to Bieneches.

The copy of Manetho which both Africanus and Eusebius used possibly did not have the names of the kings of the Fifth Dynasty (Eusebius' Fourth, Africanus' Fourth and Fifth), except Souphis, the only one Eusebius mentions. Africanus filled in the names from other sources and brought out a total of 1294 years from Menes by adjusting the regnal years to suit. The actual total to the end of the Fifth Dynasty was about 1396 years (when the overlapping of the Sixth Dynasty[19] from 4380 is taken as the measuring point). Eusebius in his list tampered with the totals of the earlier dynasties, bringing out a total of 1398 years from Menes to the end of his " Fifth " which is, however, really

the Sixth Dynasty. The Turin Papyrus does not begin a new dynasty with Userkaf but treats the "Fourth" and "Fifth" Dynasties of Africanus as one (WH. i. 192).

Whatever way we regard the lists, however, it is clear that the total to the end both of Africanus' and Eusebius' Fourth Dynasties exceeds 949 years. Now Manetho would not be likely to invent names of non-existent kings but there might be kings of which he was ignorant, and this is shown to be the case by comparison with the Sakkara and Abydos lists, so that the probability is that 949 is the total to the end of Africanus "Third" Dynasty, and that it is really the "Fourth" Dynasty, as stated above.

But there is still another way of looking at the problem. Part of the total of 949 years is 181 years. Therefore the remainder was equal to 768 years. Now in the whole period from the first to the twelfth dynasties of Africanus no single dynasty is allotted 768 years, nor do any two taken together equal 768. The only three taken together approximating to this figure are the first three of Africanus totalling 769. Unless one is to abandon Manetho without rhyme or reason and trust to sheer guesswork this must be the one component in the 949. The 181 years must, therefore, have immediately followed or preceded that. As indicated, both the Palermo Stone and the lists show that they preceded this period. Breasted decided to squeeze the Sixth, Seventh, and Eighth Dynasties into 180 years in place of the 349 years given by Manetho.

Manetho divided his chronology into three *tomoi*. The totals of the *tomoi* do not correspond with the summation of the totals given for each dynasty. Attempts at reconciliation have been made by Meyer (MA.), Schnabel (OLZ. 1911. 63), Nicklin (NE.), and others.

The first eleven dynasties and Amenemnes he totalled at 192 kings ruling 2300 years. I give the figures of

Africanus for the first eleven dynasties compared with the figures in my chronology. There is probably an error in the number of kings in the Seventh and Eighth Dynasties.

Dynasty	*Probable No. of Kings*	*Africanus No. of Kings*	*Period of Dominance acc. to my Chronology*	*Period of Rule according to Africanus*	*Discrepancy*
First	9		181 years	0	−181
Second	10	8	250	263	+ 13
Third	9	9	302	302	0
Fourth	9	9	214	214	0
Fifth	18	18 19	468 (E. 448)	277 248	+ 57
Sixth	6	6	197	197	0
Seventh	75	75	75	0	− 75
Eighth	27	27	146	146	0
Ninth	19	19	409	409	0
Tenth	19	19	100 (ruled 185)	185	+ 85
Eleventh	8	16	43 (ruled 160+)	43	0
	209	205	2385	2284	
	Amenemnes		16	16	
			2401	2300	

It may be this same period to which reference is made in Fragment No. 1 of the Turin Papyrus (BT. i. 208), " . . . 19 periods 11 years 4 months *22+x* days . . . which are in 19 periods: years *2200+x*."

The Second Tomos was stated by Africanus as 96 kings in 2121 years and the Third as 1050 years, bringing the chronology down to the end of the Thirtieth (342 B.C.) or Thirty-first (332 or 331 B.C.) Dynasty. It is not quite certain at what point the Second Tomos ends and the Third begins. So the whole period is best treated as one. Africanus' totals 2121+1050 (=3171) years do not equal the total reached by summing his totals for all the dynasties. The following is a comparison of Manetho's totals with the totals in my chronology.

Dynasty	Possible No. of Kings	Africanus No. of Kings	Period of Dominance	Manetho	Discrepancy
Twelfth	7	7	193	(A) 160	−33
Thirteenth	60	60	453	(A) 453	0
Fourteenth	76	76	429	(E) 484	+35
Fifteenth	7	7	275	(A) 284	+ 6
	32		518		
Sixteenth	25	32	240	(E) 250	+10
Seventeenth	34	43 (?34)	71	(A) 151	+80
Eighteenth	15	16	260	263	+ 3
	5	5 (to Seti II. & Rameses)	197	192	− 5
Nineteenth		246	2121	2237	−15
	4	2 (from Amenemnes)	22	12	−10
Twentieth	9	12	135	(A) 135 (E) 172	0
			304	302	
Twenty-first	8	7	169	(A) 130 (E) 130	−39
Twenty-second	9	9	116	(A) 116	0
Twenty-third	4	4	89	(A) 89	0
Twenty-fourth	1	1	6	(A) 6	0
Twenty-fifth	3	3	42	(A) 40	− 2
Twenty-sixth	9	9	147	(A) 150½	+ 3
Twenty-seventh	8	8	120	(A) 124.4m.	+ 4
Twenty-eighth	1	1	6	(A) 6	0
Twenty-ninth	4	4	21	(A) 20.4m.	0
Thirtieth	3	3	36	(A) 38	+ 2
Thirty-first	3	3	10	(A) 9	− 1
	295	312	3040	3113	

NOTE 4. THE KING LISTS ACCORDING TO HERODOTUS.

Herodotus relates what he heard from the Egyptian priests and draws his own deductions. If we try to separate the statements of the priests from his deductions, some useful information is obtained.

The priests said that Men was the first king of Egypt (II. 99), and read after him from a papyrus the names of 330 kings who were his successors, of whom 18 were Ethiopians (II. 100), the rest being natives. The last of these kings was Moeris (II. 101), who was succeeded by Sesostris (II. 102).

There is some confusion as regards Moeris, and Sesostris is evidently intended for Seti I. of the Nineteenth Dynasty. There were two versions* of the number of kings in the Seventh Dynasty, and if this was from a list which gave 5 we may assume about 33 kings in the Seventeenth (Theban) Dynasty. This would bring out a total tallying with Herodotus as follows:

First	Dynasty	9	Tenth	Dynasty	19
Second	,,	10	Eleventh	,,	8
Third	,,	9	Twelfth	,,	7
Fourth	,,	9	Thirteenth	,,	60
Fifth	,,	17	Fourteenth	,,	76
Sixth	,,	6	Seventeenth	,,	33
Seventh	,,	5	Eighteenth	,,	16
Eighth	,,	27			
Ninth	,,	19			330

But he said that there were 341 kings from Menes to Sethos who succeeded Sabacos (II. 140, 141), thus only

* In the later copies of Manetho, and possibly before Manetho's time also in the original Egyptian records existing in Herodotus' day.

allowing 11 kings from "Sesostris" to Sethos, who is presumably Sebichos (702-688 B.C.), whereas there were in reality (excluding co-regencies) 39, bringing the total to 369, as follows:

Nineteenth	Dynasty	6	Twenty-fourth	Dynasty	1
Twentieth	,,	9	Twenty-fifth	,,	2
Twenty-first	,,	8			—
Twenty-second	,,	9			39
Twenty-third	,,	4			

There were 10 more kings before the Persian Conquest, bringing out a total of 379 native and Ethiopian kings and queens, as compared with 479 allotted by Diodorus, who reckoned the Seventh perhaps as having 70 kings, and has evidently introduced a further 35 somewhere.

Herodotus also stated the number of "generations" of priests.[55]

NOTE 5. THE PALERMO STONE.

M. Emile Guimet when visiting Palermo in 1895 discovered, lying neglected on the ground in the corner of a courtyard, a fragment* of a stone tablet (AG. xxv. 6), inscribed on both sides, about 17 inches high and 9 inches broad (now in the Museum of Palermo). It is not known whence the stone came, but on it can be deciphered the names of some of the early Egyptian kings, and annals of some of the years of their reigns. The inscriptions on the Palermo Stone were first published by Pellegrini in 1896, but it was not till 1901, when Maspero gave his views on it, that it was recognised as a fragment of the annals of the early kings. In 1902 a complete translation was published and discussed by Schaeffer. Sethe discussed it in his *Untersuchungen* in the same year. Meyer, in his Chronology, commented on it, and Borchardt devoted a book to its elucidation in 1917, which now forms the standard work of reference. Weigall, in his History (1925), has also dealt with it. Another fragment[6] of the same tablet, or of a duplicate, is in the Cairo Museum.

In default of astronomical evidence it is possible from the stone to deduce a period of as much as 1520 years from Menes to the end of the Fifth Dynasty or as little as 820 years (Weigall), and equally possible to make the length any one of the 700 intervening lengths. When permutations in the lengths of reign of individual kings are taken into account it is obvious that, if the record of Manetho is to be frequently set aside as untrustworthy, the possible solutions within these limits number many thousands, and

* See Plate I.

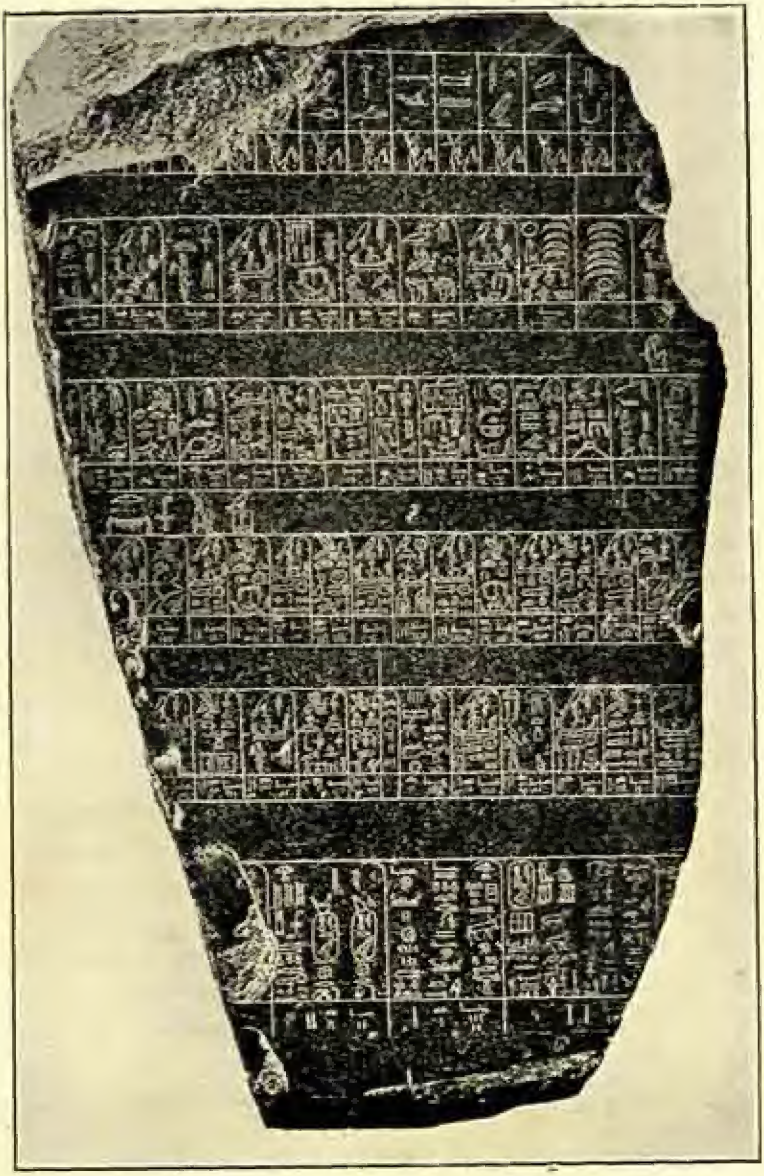

PLATE I. THE PALERMO STONE.

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See Note 5. *(facing page 46)*

the chance of any one of them (my own previous solution included) being entirely correct is remote. It is, however, obligatory on anyone framing a chronology of the first five dynasties to show that a solution of the stone fitting their chronology is possible, but such a chronology would require some evidence to support it other than the evidence deduced from a guess as to the size of the original stone to entitle it to be considered as probably and not merely possibly correct.

Such evidence I believe I have found in inscriptions on some of the extant year spaces quoted by Breasted and Weigall, for I think it can be shown with a high degree of probability that these are references to astronomical cycles and admit of perhaps only one solution.

There are parts of six lines on the front of the Palermo stone and the second, third, and fourth lines appear to contain important clues.

THE SECOND LINE ON THE PALERMO STONE.

According to Breasted (BR. 57ff.) the following items are recorded among others on the second line on the Palermo Stone.

1st year. Birth of Anubis.
2nd year. End of one king's reign, and accession of another.
3rd year. Feast of Desher.
6th year. Feast of Sokar.
7th year. Birth of the goddess Yamet.
8th year. Birth of Min.
9th year. Birth of Anubis.
10th year. First occurrence of the Feast of Zet.

It is evident that these are recurring festivals, and probable that they recur at regular intervals. They all reappear on other parts of the stone, and in addition in the third line the Births of Seshat and Mefdet are recorded. The fact that there are five "births" suggests that these celebrations have reference to the cycles of the five planets known to the ancients. On this assumption we may assign

Anubis to Venus, for on this fragment there is an 8 year interval between the two celebrations and Venus is the only planet with an 8 year cycle.

Min was at one period the name of the month corresponding to Jupiter's sign Sagittarius and Min is therefore probably Jupiter (which has a 12 year cycle). Yamet cannot be Mercury which has a cycle of 6 (sometimes 7) years for it would be found recurring frequently on the stone which is not the case. It must therefore be either Saturn (which has a 30 year cycle) or Mars (which has a 17 year cycle).

There is also a clue to the meaning of the Feast of Zet. As we here have not only its first occurrence in the king's reign but the first record of it on this portion of the stone, the interval from one occurrence to the next must be at least 10 years and may be greater. In the next line on the stone its "second occurrence" in a king's reign is mentioned so that the interval cannot be greater than is possible in one king's reign. In the fourth line it is mentioned in the 14th space, which shows that the interval cannot be less than 14 years. The only astronomical interval, therefore, to which it is likely to refer is the ordinary conjunction of Jupiter and Saturn which takes place about once in 20 years as the ordinary Mars and Saturn periods would be described as "births." As regards the Feast of Sokar the fourth line shows both the "second occurrence" and "third occurrence" at 6 years interval apart, which at once suggests Mercury, and this is fully borne out by the Feasts of Sokar and the Isidia[1] in later calendars, where it is evident that the Feast is celebrated at the period of invisibility of Mercury (normally when it commenced in fixed Hathor). (Mercury's cycle is by no means exactly 6 years for it rises about 11 days later in the year after 6 years, and to avoid continual adjustment, 8 Feasts of Sokar may have been held at

intervals of 6 years making a total large cycle of 48 years and then a new cycle may have been commenced. The first Feast in the 48 year cycle might be held when invisibility commenced about the date of Rising of Sirius, 14th July and the last Feast of the large cycle might be held in the 43rd year of the cycle in the end of September Julian, corresponding at that time to the end of the month fixed Hathor.)

We thus fortunately have on this second line of the stone a large amount of astronomical evidence in the space of 10 years. The chance of any particular series of 10 years tallying for the phenomena postulated, excluding the Feast of Sokar owing to the uncertainty of its date and the possibility of making any year tally for it, is theoretically $\frac{1}{8} \times (\frac{1}{17} + \frac{1}{30}) \times \frac{1}{12} \times \frac{1}{20}$ which equals 1 in 20,125.* If therefore, it is possible to find a date tallying within a reasonable distance of the date otherwise assignable to Menes there will be a probability both that the planets are correctly identified and that the period in question is the period indicated on the stone. If the first year is 5715-4 (or perhaps 5714-3) the phenomena tally thus (the date of Rising of Spica being then roughly 24th August):

5715-4	1st year.	Morning rising of Venus	c. 17th July	5714 B.C.
5710-9	6th year.	Mercury invisible at inferior conjunction	c. 15th September to 8th October	5709
5709-8	7th year.	Saturn rising	c. 29th August	5708
5708-7	8th year.	Jupiter rising	c. 9th August	5707
5707-6	9th year.	Morning rising of Venus	c. 15th July	5706
5706-5	10th year.	Rising of Jupiter	c. 6th October	5705
		Rising of Saturn	c. 28th September	5705

So far as this evidence goes we have no clue as to which king's reign ended on the fragment or the name of his successor. But reckoning back from the beginning of

* If however we regard Yamet as certainly Saturn the chance as it happens is not so remote for if Saturn's cycle began in the 7th year and Jupiter's in the 8th, their conjunction would of necessity occur either in the 9th or 10th, and the chance of occurrence of the series is not more remote than $\frac{1}{2} \times \frac{1}{30} \times \frac{1}{12} \times \frac{1}{8} = 1$ in 5760, the above being merely the crude probability.

the Second Dynasty 181 years for the period from the commencement of the First Dynasty to the commencement of the Second Dynasty as recorded on the Turin Papyrus we obtain 5776 B.C. as the date of commencement of the First Dynasty. As the end of a reign on the stone falls in 5714-5713, 62 years later, it is possible that this is the end of the reign of Menes, to which Manetho allots 62 years.

The date is earlier than the probable date of the introduction of the 365 day calendar, which might take place at the commencement of a Sothiac cycle in the Second Dynasty. We may, therefore, suppose that the Sacred lunar Calendar was still in use. In it Hathor, of which the mean date of commencement was the Rising of Spica, was the fourth month, Mesore being the first month. In later lines on the fragment, where one king's reign ends and another begins the months and days on the portion of the last year space of the earlier king added to the number on the portion applicable to his successor total 12 months 5 days, showing the use then of a 365 day calendar. At the change of reign we are considering, however, the first king's portion records 6 months 7 days and his successor's portion 4 months 13 days (BA. 32). Now it is possible that the 13 days may really be 23, for there is space for a second 10 hoop which may have been erased. This would complete a lunar month of 30 days. It is impossible to assume the omission of 15 on either portion of the stone. The placings of the hieroglyphs do not permit of this. Therefore the inscription here cannot be made to conform with the 365 day calendar, except on the assumption of an interregnum (which would, if it occurred, probably have been included by the new king in his own reign for chronological purposes). There is space for an extra month symbol also in the new king's portion of the year, and we may therefore postulate that the year was divided

as follows between the kings: Menes 6 months 7 days, Atoti 5 months 23 days: total, 12 lunar months.

As Borchardt states the breadth of each year space in the second line as averaging about* 11.15mm., these 181 years, if all on this line and with year spaces constant in breadth, would measure 181 × 11.15 mm. = 2018.15 mm., which, as we shall later see, would not occupy the whole breadth of the complete stone.

THE THIRD LINE ON THE PALERMO STONE.

According to the list of Eratosthenes[9] the Great Conjunction of 5447 B.C. fell in the 20th year of Onenophes or near the completion of his 20th year, and on the assumption that Manetho's figures from that point on to the end of the Second Dynasty are not wrong by more than 30 years the dynasty ended not earlier than 5355 and began not earlier than 5608. It is clear, therefore, that the dates shown by the second line of the Palermo Stone must have fallen in the First Dynasty as already suggested and there is a possibility that the third line contained the reign of kings of the Second Dynasty.

We may now proceed to examine the astronomical evidence on the third line. It is as follows according to Breasted (BR. 59ff.):

3rd year. Sed Jubilee.
5th year. Second occurrence of the Feast of Zet.
6th year. Design of the House "Thrones of the Gods."
Feast of Sokar.
7th year. Stretching of the Cord for the House "Thrones of the Gods," by the priest of Seshat.
8th year. Opening of the Lake of the House "Thrones of the Gods."
11th year. Birth of Sed.
12th year. First occurrence of Running of Apis.
13th year. Birth of Seshat and Mefdet.
14th year. Birth of „ „

* These, as I understand it, are scale measures only, not actual measures. Borchardt thinks the Palermo fragment and Cairo fragment are fragments of different tablets and on different scales. With Weill I assume that they are the same, but that the year spaces were somewhat irregular in breadth. The scale measures quoted here are actually Borchardt's from the Cairo fragment, not the Palermo fragment.

We have seen above the meaning of the Feast of Sokar, the Birth of Seshat and Mefdet (one of which must be Mars, since Yamet proved to be Saturn), and my examination of the Sed Festivals in the Eighteenth Dynasty (MB. 168ff.) showed that they were held when the New Moon appeared close to the date of Rising of Spica. We have, therefore, 4 known factors in this line, of which 3 are valuable for fixing a precise date. The chance of the phenomena occurring in a given 14 years in the sequence stated on the stone is approximately $\frac{1}{8} \times \frac{1}{20} \times \frac{1}{17}$ which equals 1 in 2720. If, therefore, we find any period tallying which is within reasonable distance of the date already allotted to the First Dynasty there is a probability that it is the date indicated.

Examination shows that if the first year on the stone ended in September 5550 B.C., the phenomena tally thus:

5549-48	3rd year.	Astronomical New Moon		24th August	5548 B.C.
5547-46	5th year.	Saturn rose	c.	8th February	5546
		Jupiter rose	c.	18th February	5546
5546-45	6th year.	Mercury invisible	c.	20th September to 3rd October	5545
5541-40	11th year.	Astronomical New Moon		26th August	5540
5539-38	13th year.	Rising of Mars	c.	30th September	5539
		Evening Rising of Mercury	c.	5th September	5539

Though the Wandering Calendar was, perhaps, by this time in use, the lunar calendar would still be used by the priests, and the kings might date their reigns from the first of the 4th lunar month (Hathor), of which the mean position was near the Rising of Spica (then about 24th August), though sometimes as much as a month later or earlier, as in the Babylonian calendar. Evidently the 4th, 7th, and 12th years on the third line must have begun about one month later than the Rising of Spica.

Breasted has pointed out (BR. 61, Note a) that there must have been at least 16 years of the king (whose regnal years are on this line) earlier than the first year on the

stone, since a portion of the royal name is on the first year on the fragment and must at least have occupied the space of 4 years, while as many years would be before it as after it. The names may not have been exactly central, however, and this should be taken as an approximation only.

The fact that the Feast of Zet in the 5th year 5547-6 was the "second occurrence," shows that the previous conjunction of 5566 must have fallen in the reign, while that of 5586 did not.

The minimum duration of this king's reign was, therefore, from about 5567 or 5566 to 5537, and may have been longer. We have already seen that the Second Dynasty commenced about 5595. Africanus gave the reign of the first king Kenkenes as 31 years and Eusebius gave 39. The chronology requires about 29.

It is possible, therefore, that the king, part of whose reign is on the third line of the fragment, is Benoteren.

. . . . .

Borchardt states the average breadth of the year spaces in the third line as 9.20mm. There were about 45 years of this dynasty to the right of the fragment and 205 from the first year on the fragment to the end of the dynasty, representing a space of about 414mm. to the right and 1886mm. to the left, 2300mm. in all.

THE FOURTH LINE ON THE PALERMO STONE.

The Astronomical evidence on the fourth line is as follows (BR. I. 61ff.):

1st year. Stretching of the cord for the House Hor-Ren.
3rd year. Running of Apis.
5th year. Second occurrence of the Feast of Sokar.
7th year. First occurrence of the Feast "Worship of Horus of Heaven."
9th year. Second occurrence of Running of Apis.
11th year. Third occurrence of the Feast of Sokar.
13th year. —— Feast of Zet.

There is also a fourteenth year and a fraction of

another year on the stone. The "numbering" is shown regularly every two years, the tenth occurrence taking place in the last year on the stone. The Royal Name "Neterimu" is above years eleven to fifteen on the stone, which as Breasted shows (from the "numberings") must represent years 17 to 21 (or 16 to 20) of the king. As the name was probably near the centre of a king's reign he estimated that there would be approximately 16 years of the reign after the name, making a total of 37 years.

We have here as our astronomical guide the Feasts of Sokar and the Feast of Zet, but this is not nearly so sure a guide as we had for the two previous lines, the chance being only 1 in 20. We must, therefore, depend on Manetho's figures for the approximate date of Binothris, with whom Neterimu may be identified, using the stone only to give more precision within these limits but admitting the possibility that Manetho may be wrong and the data in question 20 or 40 years earlier or later. The following are possible dates to tally with the stone:

5258-57	5th year.	Mercury invisible	c. 18th July to 12th August 5258.
5252-51	11th year.	Mercury invisible	c. 29th July to 22nd August 5252.
5250-49	13th year.	Jupiter rising	c. 10th March 5249.
		Saturn rising	c. 19th March 5249.

If the 11th year was as Breasted thought the 17th of Benoteren, he must have begun to reign in 5268, which tallies with Manetho, but Manetho gives him a reign of 47 years instead of 37. Perhaps he adopted his successor as coregent in his 38th year.

The first year on the fragment being 5262-1, there are about 83 years to the right and about 219 from that year to the end of the dynasty. The relative breadth of the year spaces being about 7.51mm., there would be 623.33mm. to the right and 1644.69mm. for the remainder, 2268.02 in all.

THE FIFTH LINE ON THE PALERMO STONE.

In the fifth line on the fragment there is only one astronomical clue which can be recognised, and we must rely mainly on Manetho. The following ceremonies are recorded:

2nd year	"The Goddess Abides" was built of stone.
6th year	Fourth occurrence of bringing the Wall of Dewazefa.
9th year	Birth of Min
10th year	Stretching of the Cord for the House called "Shelter of the Gods."

In the seventh year on the stone one king's reign ends (after 2 months 23 days) and another king's reign begins. As Breasted points out the reign of the first of these kings was either 16 or 17 years 2 months 23 days. Now as we have seen above the fourth line probably contained the Third Dynasty, so that the fifth line probably contains the Fourth. In Manetho's list the only kings with a reign of 17 or 16 years are Mesochris and Souphis. Of these the former is the more probable. Reckoning with Manetho 81 years from the end of the Third Dynasty about 5043 to the end of Mesochris' reign we get 4963-2 as an approximate date for his last year. As the Birth of Min occurred in the 3rd year of Souphis and Jupiter's rising near Spica occurred in 4959 B.C. (about 2nd September) we may regard 4959-8 as the 9th year on the Stone and 3rd of Souphis, which would give 4962-1 as Mesochris' last year and 5042 instead of 5043 for the beginning of the Fourth Dynasty.

In the fifteenth year of Mesochris is a record translated by Breasted "Birth of Khasekhemui" and by Weigall "making a statue of Khasekhemui." If the latter is right it may be that Khasekhemui is the equivalent of Mesochris (though the name was formerly thought certainly equivalent to Sesochris).

In this line there were 75 years to the right of the fragment, and 139 from the first year to the end of the Dynasty. Borchardt's relative measure for the year spaces is 9.62mm., which indicates about 721.50mm. to the right and 1337.18mm. for the remainder, 2058.68mm. in all.

. . . . .

It will have been noted that on the standard used the amount of space used to right and left of the fragment in each line of the stone varies considerably in each line thus:

To left of first space on fragment		To right	Total
3rd line	1886mm.	+414mm.	=2300mm.
4th line	1644.69mm.	+623.33mm.	=2268.02mm.
5th line	1337.18mm.	+721.50mm.	=2058.68mm.

The fragment is broken irregularly so that the first year space of one line is not always immediately over the first year space of the next. The above comparison is not strictly accurate, therefore, but it is sufficiently so to show that the records of each dynasty did not extend equal distances on either side. Probably therefore before each dynasty there were introductory remarks or titles, explaining, for example, whether the kings were kings of Thinis or Memphis, and we may perhaps suppose that the extra space to the left on the fifth line contained the total from Menes, just as it is totalled at this point[3] on the Turin Papyrus. Other discrepancies are explainable by the fact that the year spaces were not really as regular as is postulated.

The second line would possibly contain the whole of the First Dynasty, not merely the 181 years till the Second Dynasty began. So we may estimate roughly the relative breadth on second and third lines to average as follows to the left of the first year on the fragment:

2nd line $164 \times 10.67 = 1749.81$mm.
3rd line $205 \times 8.53 = 1748.65$mm.

It will be seen that a variation of half a millimetre in

the estimate average breadth is enough nearly to equalise these two to the left and probably the workmen varied far more than that in their spacing.

The Sixth Line on the Palermo Stone.

The sixth line contains spaces with the name of Snofru II. It will be seen that I have abandoned my former theory that Necherophes was Snofru I. and now regard Sephouris as Snofru I. and Soris of the Fifth (Africanus "Fourth") Dynasty as Snofru II.

The very irregular spacing of Snofru II.'s years in the sixth line indicates that they were executed by a different hand from the previous lines. It seems to me therefore that Snofru II. gave orders to inscribe the stone with the annals of his predecessors and after his death Khufu employed another workman to put Snofru's annals on the sixth line. The annals of Cheops (Khufu) would occupy the whole of the next line.

The Back of the Fragment.

On the back of the fragment are portions of very large year spaces. They contain no astronomical evidence. At the top is a portion of the first year space of Shepseskaf. The next line is almost wholly occupied by the "year of the third cattle numbering of Userkaf." As the numberings were normally every second year, this is probably his 6th or 5th year. We have judged the breadth of the stone from the dynasties on the front, and it is clear that between Shepseskaf's first year and this year of Userkaf there is room for about 20 year spaces, so that Shepseskaf might have had 14 years and Thampfthis 2 or Shepseskaf 7 and Thampfthis 9 as Manetho states. The next line shows year of "tenth numbering" of Sahure, his 20th or 19th

year. If it was his 19th year Userkaf must have reigned 8 or 9 years acording to the stone. The next line shows the end of one reign and the beginning of another. This must be the end of Neferkere's and beginning of Shepseskere's. The portion of Neferkere's last year has the inscription "year after seventh numbering," presumably his 15th year. There are portions of two years of Kheres (Nefer-f-ra) on the next line.

RECORDS OF HIGH NILE.

Borchardt drew attention (BA. 5ff.) to the fact that the records of high Nile on the Palermo fragment are all placed under the later portion of each year space and reasoned from this that the date of high Nile was at the periods to which the fragment related late in the calendar year. In particular he noted that in the 4 cases in which the year spaces were divided at the division between reigns of kings it was under the second portion. Weill, however, pointed out that the absolute uniformity (WC. 102) of the position of the record implied that the position was merely a conventional one and bore no relation to the part of the year when high Nile took place.

While Weill's theory seems to me more likely to be the correct one, it so happens that my chronology is not out of harmony with Borchardt's theory. According to it, in the year in which Khosekhemui's reign ended, high Nile would be later than the 23rd day of the 2nd month; in the first year of Shepseskaf it would be later than the 24th day of the 5th month; and in the first year of Neferirkere later than the 28th day of the 10th month.

The mean date of high Nile is about 27th September (Gregorian) (with an earliest date of about 25th August and a latest about 27th October). In my chronology Khosekhemui's reign ended in 4961 B.C., when 27th September

(Greg.) = 5th November (Julian) = 19th of 8th month of the Wandering Calendar: Shepseskaf's first year was 4580 when 27th September (Greg.) = 2nd November (Julian) = 21st of 11th month: Neferirkere's first year was 4538 when 27th September (Greg.) = 2nd November (Julian) = 1st of 12th month. Thus all three comply with Borchardt's requirements.

As we have seen above the date of accession of Menes' successor may have been 6 months 7 days from the beginning of the old lunar calendar (on 1st Mesore, of which the mean date was about 90 days before the Rising of Spica). He, therefore, succeeded roughly 97 days after the Rising of Spica within about 30 days of 29th November (Julian) = 15th October (Gregorian) which would be very near the date of high Nile, and it may quite possibly have occurred in his portion of the year.

M. Jequier pointed out that the average of the Nile levels recorded on successive lines of the stone progressively diminished and that as the Nile is estimated to rise on an average about 1.25 to 1.1 metres in 1000 years, the records must be the depth below a mark from which measurements were taken down to the high Nile. From the records given a rough estimate can thus be formed of the interval from Menes to Snofru.

Petrie quotes (PS. 19) the averages of the Nile levels on each line as follows:

(1st)	2nd line	5.30 ± .20 cubits.
(2nd)	3rd line	4.57.
(3rd)	4th line	3.49.
(4th)	5th line	3.50 ± .20.
(5th)	6th line	3.28.

As the averages are based on a small number of years in each case there is room for a considerable margin of error, say .6 cubits, which might be more than 250 years.

But such as it is the evidence shows a difference in

Nile level of $5.30 - 3.28 = 2.02$ cubits $= 1.05$ metres $= 1050$ or 850 years ± 250. Therefore the maximum interval from the end of Menes' reign to the middle of Snofru's would be about 1300 and the minimum about 600. The interval given in the Chronology (based on the astronomical evidence and lists) is about 900 years, which falls between these limits. The interval given by Hall is about 400 years (CA. i. 661), by Meyer about 500 years (MG. i. 17 & 167) and by Petrie (AE. 1929-42) as slightly under 800 years.

NOTE 6. THE CAIRO FRAGMENT.

A fragment either of the same stone as the Palermo fragment or of a duplicate is now in the Cairo Museum. Published and discussed originally by Gauthier in 1915 and later discussed by Daressy, it is fully examined by Borchardt in his *Annalen* (1917).

A portion of the top line containing a king in each year space is visible. In the second line are 9 year spaces, being part of the reign of a king whose name appears above read by Borchardt as Itt-Dr. The centre of the name is above the fourth to fifth spaces on the fragment, which would therefore fall roughly about the middle of his reign. The first space records the Birth of Anubis, the fourth the Feast of Sokar, and the eighth the Feast of Desher. The Feasts of Sokar and of Desher are not of any assistance, but the Birth of Anubis is of slight assistance if the approximate date is otherwise known, limiting the date of the first year to 1 out of each 8 years. It has been conjectured that Itt-Dr is the same as Athothis, but as there are three kings Athothis in the Abydos List after Menes we have not yet any firm ground.

The third line, however, contains the name Smr-ht (BA. 36). This king is clearly earlier than Neteren, who was on the fourth line of the Palermo Stone and identified with Binothris. The only names in the lists at all resembling it are Sendi and Semempses. But Semempses is impossible, for if this king were Semempses, Athothis on the line above would require to be as far from Menes (taking relative sizes of the year spaces into account) as Semempses is from Udy Semti, whose position was

astronomically determined as early in the Second Dynasty. The king on the third line of the Cairo fragment must therefore be Sendi. His whole reign is on the st ne, and the end of his predecessor's and beginning of his successor's reign. He is allotted 9 years and a fraction. As in the King Lists he preceded Neferkere, whose date is astronomically determined from the list of Eratosthenes[9] as 5467-5444, so his reign must have ended according to one method of reckoning in 5467. But there is a further check, for the Birth of Anubis is recorded as taking place in his 3rd year. Venus began its cycle in 5476 B.C., when it rose about 22nd September. The Cairo fragment, therefore, reckons his reign as 5478 to 5468, a discrepancy of a year.

As the last year on the third line of the Palermo Stone was 5538-7, there would be 60 year spaces from the beginning of that year to Sendi's first year. Taking the assumed average of 8.53mm. per space the interval is $60 \times 8.53 = 511.80$mm. Therefore the interval on the preceding line with an assumed average of 10.67mm. would represent roughly $\frac{511.80}{10.67} = 48$. As the last year space on the Palermo Stone (second line) was the 9th year of the first Athothis (5706-5) the spaces on the Cairo fragments (second line) must represent approximately 5658 to 5649. But Venus began its cycle in 5655 B.C., when it rose about 10th September, so 5655-4 will be the first year on the fragment and 5652-50 would be under the name. As the chronology stands, that is not in the centre of the reign of Diabies, the third Athothis, but the lengths of reigns at this point are not well fixed.

There is no other astronomical evidence on the Cairo fragment.

NOTE 7. THE SECOND DYNASTY.

A portion of the reign of Benoteren is dated from the fact that it is probably he who is named on the third line of the Palermo Stone[5] under the name of Udi. Sendi is dated exactly if he is the king whose reign is given on the third line of the Cairo fragment.[6] Onenophes is dated by the conjunction which occurred in his twentieth[9] year 5447, and the end of the Dynasty must have been in 5345, since that is astronomically fixed as the date of commencement of the Third (Africanus "Second") Dynasty. This gives 250 years for the Dynasty as compared with the 252 of Eusebius and 253 of Africanus.* It looks as if the Turin Papyrus total for Huzefa (11 years 8 months) is an error for 21 years 8 months. Neferkere is recorded as living 70 years on the Papyrus, Neferkesokar $20+x$, and Huzefa 34 (MG. 136). Neferkere may have been still ruling as coregent successively with Neferkesokar and Huzefa, for the former would only be $12+x$ years of age when he succeeded and the latter 12½ years. The Papyrus omits Semempses and gives Nebka only 19 years.

Manetho recorded, not of the Kekau in this dynasty but of the Kekau in the next dynasty, that he introduced the worship of Apis. But as the Palermo Stone records the Running of Apis in this dynasty, it was probably the first king of this dynasty who introduced it. It was probably in his reign also that the 365 day calendar was introduced, for the 1st of the 1st month Hathor coincided[1]

* The regnal years when totalled are 258 (E.) and 263 (A.) thus not corresponding with the totals stated by them.

about 5578 B.C. with the rising of Spica and the beginning of the Flood Season.

Kekau probably did not have his capital at Abydos, for his contemporary Gosormies was buried there, and Gosormies' successor, Normer, probably made himself overlord of Kekau and the North. Kekau's capital may have been at Sakkarah or Memphis. But Benoteren "the overthrower" possibly conquered the South after the death of Mares Heliodorus (Nor-Mer) and established himself at Abydos (or Thinis) for his tomb is there.

Onenophes is probably the king who should be identified as Osiris for it is recorded frequently that the true name of Osiris was Onnophris. The list of "great conjunctions" starts with that which occurred in his reign. (By some mistake, however, the tomb of Zoser became a shrine associated with Osiris, who was confused with Sirius.)

NOTE 8. INDIAN AND BABYLONIAN KING LISTS.

Dr. Waddell has recently published a book in which he expresses the view that Menes is to be dated at c. 2700 B.C. He bases this on the assumption that the Indian Asa Manja, the Egyptian Menes, the Akkadian Manishtusu, and the Cretan Minos, are one and the same person. He accepts the approximate date assigned by some chronologists to Manishtusu, and dates Menes accordingly.

In proof of his assertions he compares the whole of Africanus' First Egyptian Dynasty with names in Indian and Babylonian lists as follows:

Indian (Acc. to Waddell)	*Babylonian* (Acc. to Waddell)	*Egyptian Lists* (Petrie)	(Budge)	(Manetho)	(Abydos Tablet)
1 Asa-Manja or Manasyu	Manj Manash or Aha Mena	Normer, Men	Aha	Menes	Mena, Manj
2 Anjana or Karamba	Narmar or Narama	Aha	Narmer	Athothis	Teta
3 Kuntijit or Dilipa	Guni or Shargani	Zer-ta	Khent	Kenkenes	Atta
4 Bhagi-Ratha	Bag-Gid	Zet-Ata	Teha	Uenephes	Ata
5 Devana-kshatra or Dundu or Sudyumua	Dudu or Shududu	Den-Setui	Ten, Semti	Usaphaidos	Hesapti
6 Bahu-Bida	Bidi, Lord Mar	Azab-Merpaba	Atab	Miebidos	Merbap
7 Sampati or Soma	Sheshimmash or Pa or Khat	Semerkhet Semshu	Hu (?)	Semempses	Semenptah
8 Suhotra	Shudur-kib or Kibbu or Qa	Qa Sen	Qa or Sen	Bienekhes	Kebh

Waddell has given some additional alternative renderings, but any I have omitted are less favourable to his theory than those I have included.

He gives the Second Dynasty with Indian Lists thus (WE. 138):

Egyptian	*Indian*
Razan	Rajeyu
Kákau	Kaksheyu
Banetelen	Sthandileyu
Uames	Vriteyu
Senda	Juleyu (or Santateyu)
Khailes	Sthaleyu (or Jaleyu)
Neferkara	Santateyu
Sesechris	Dhaneyu
Keneres	Vaneyu

Waddell's conclusions depend on a number of factors, the authenticity and date of the Indian King Lists, the preference of Waddell's interpretation of Sumerian cuneiform and Egyptian hieroglyphs to the interpretation of other scholars, the extent of resemblance between the Indian King Lists and the Sumerian and Egyptian King Lists, the selection of the date of Naram Sin as a point from which to measure other dates, the preference in the case of Babylonian kings' names to the order and relative date denoted by supposed equivalents in the Indian King Lists rather than the lists of the Isin priests, and the possibility of fitting in 17 Egyptian Dynasties between 2700 and 1600 B.C. without conflicting with the astronomical and other evidence.

It is possible that the Indian King Lists used by Waddell, the Puranas, are authentic and that they date back to an early period, but it is to be borne in mind that the earliest written copies known only date back to the first century A.D. and portions of the list only to the fourteenth century A.D., while the lists of the Isin kings can be proved to have been written down in the third millennium before Christ. The presumption is, therefore, in favour of the Babylonian lists as against the Indian lists if the two are in conflict, especially as Waddell himself admits (WE. 144) that the " Indian lists themselves preserve no dated chrono-

logy whatsoever as the Indian scribes and Brahmans have always been notoriously lacking in the historical sense," and that the Sumerians had a "remarkably developed" historical sense. This presumption can only be rebutted by proof to the contrary which Waddell has not adduced. All he has done is to assert that what he calls the "confused condition of early Mesopotamian chronology has recently become acutely intensified by the unscientific and credulous acceptance by Assyriologists of the long string of purported dynasties with absurdly fabulous ages which the superstitious and ill-informed later Isin priests prefixed to the First Dynasty of the Kish Chronicle." (WE. 141.)

In the above lists the following is the transcription of the Akkadian kings' names as given by Langdon in the order in which the Isin priests wrote them down.

1. Manishtusu; 2. Naram Sin; 3. Shargalisharri; 4. Igigi; (5. Imi; 6. Nani; 7. Elulu); 8. Dudu; 9. Gimil-durul.

It will be seen that the resemblances are not so close as in Waddell's transcription, and even when all allowances are made it cannot be said that resemblances to the Indian list are striking.

It will be readily granted that Professor Waddell (following the discoveries of Sir J. Marshall) has done much useful work in collecting examples of script from India which bear a close resemblance to Sumerian script, that it is possible, perhaps probable, that the Sumerians and the early Aryans of North India spoke similar languages and were of related stock, and even that some of the seals which have been found in India may bear a form of the name of Sargon of Akkad, but that does not prove that Indian king names remotely resembling Babylonian names are all to be identified with them, or imply that evidence is adduced calling for an alteration of chronology. One may

well ask why Asa-Manya should be more likely to be identical with Manishtusu than, for example, with Manu, King of Magan, from whom Naram Sin relates that he obtained diorite.

But we are more concerned here with resemblances to Egyptian names. To avoid confusing the issue we will confine the enquiry to resemblances between the Babylonian and Egyptian names since it is on a Babylonian date that Waddell founds his chronological argument. We may admit as bearing a resemblance any two names which have the same first two consonants in the same order, and we may consider consonants the same if they belong to the same group, *e.g.*, p, b, ph, f, bh, v, as the same.

Now there are 10 groups of consonants (or more or less according to method of grouping adopted). Therefore the chance of a particular name having the first two consonants the same and in the same order as in another name is $\frac{1}{10}\cdot\frac{1}{10}=\frac{1}{100}$. We may limit our period of search in Egyptian King Lists for a name beginning MN to the first 100 names. Now the chance of finding such a name in the first 100 is precisely $\frac{100}{100}$, namely 1. In other words it would be contrary to probability if there were not such a name. Therefore, the mere fact that there is a Manj in Akkad and a Menes in Egypt does not imply that they are identical.

But Waddell goes further. After equating Manj with Menes, he asks us to note that other kings taken in the exact order of the lists bear resemblances. Having thus fixed Menes the search through the names of 100 kings is now inadmissible and we must note resemblances only in names of kings occupying the same relative position in the lists. But the lists from Petrie and Budge are not ancient lists. They are excerpted names from monuments and lists, and while admissible in a general search over a wide field for similar names we cannot reasonably argue that

because Budge puts Narmer after Aha whom he identifies with Menes that that is with certainty the correct position for Narmer. We must necessarily confine our comparison to lists as such. That of Manetho and the Abydos list being the only two which Waddell has quoted, we will confine our comparison to these.

Comparing Manetho's list first we find that there are only two kings after Menes which fulfil the requirements of resemblance, namely, Kenkenes and Semempses, but there are alternatives in the Babylonian list, and the chance of Kenkenes resembling Guni is not more remote than $\frac{2}{100}$. In the case of Semempses the Babylonian equivalent gives 3 choices so the chance in that case is $\frac{3}{100}$. The chance of two pairs of successive kings thus resembling each other would not be more remote than $\frac{2 \times 3}{100 \times 100}$, but these two pairs are not successive, so that the real chance is not nearly so remote as $\frac{6}{10000}$ = roughly $\frac{1}{1666}$ yielding a probability of $\frac{1665}{1666}$ = .9994 in favour of connection between the lists. This might be entitled to be called probability in the absence of evidence to the contrary. But there are many pieces of evidence against placing the First Dynasty contemporary with the Dynasty of Agade, each with a much higher probability attaching to them. The position, of course, would have been different if Manishtusu were known to have been King of Egypt on other grounds and we had a complete list of names of kings of Egypt among which the only one with the consonants MN was Menes.

If Waddell prefers to take the Abydos list for the test he fares no better, for after Menes the resemblances are Merbap (which is not read Merbap but Miebis by Meyer) to Mar, and Kebh to Kibbu (for we cannot allow Semenptah which is purely a conjecture, all that is visible on the Abydos list being the letter S).

We may pass now to a consideration of the Second Egyptian Dynasty as compared by Waddell with Indian king names which in the Indian lists are by no means certainly to be regarded as consecutive after Suhotra. Now though we may be indulgent to Waddell in his transcription of Babylonian cuneiform we cannot allow him to play tricks with Manetho who wrote in Greek and quite distinctly wrote Boethos, not Roethos or Razau.

The admissible initial consonantal resemblances then seem to be confined to two pairs, Kakau and Kaksheyu, Senda and Santateyu, and I think this list will not be regarded as any more convincing than the previous one.

It need only be added that Waddell does not show us how to fit in dynasties 3 to 17, that he overlooks the fact that Egyptian vases of Twelfth Dynasty style are inscribed with the names of Manishtusu and Naramsin, and that he shuts his eyes to the astronomical evidence. Thus though Fotheringham has clearly shown that the dates of harvest contracts would fall too early in the year under Thureau-Dangin's solution of the Venus Tablets* and that the solution is therefore inadmissible, he writes that Dangin's dates are "the only ones which satisfy the calendar references of history and they remain the most authoritative." No comment whatever is made on the Sothic cycle, except to assert that "there is no evidence that the Egyptians ever used the Sothic cycle as an era" (WE. 155).

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A large part of Waddell's chronological argument also depends on resemblances which he sees between Egyptian inscriptions of the First Dynasty and Sumerian writing of the Sargonic period (WE. 57). While it is possible that they have some relation to each other (and Waddell has

* Of Ammizaduga, one of the kings of the "Amorite" Dynasty at Babylon. Cf. also my date for Ammizaduga (MB.).

rendered a service in noting some similarities) the resemblances are not sufficiently close to warrant any conclusion that they are contemporary. The resemblances can indeed only be admitted as resemblances at all on the assumption that the Sumerian writing is much more stylised than the Egyptian pictographs with which it is compared, and presumably therefore of later date than these pictographs. How much later it is quite impossible to estimate from such evidence.

NOTE 9. THE PHŒNIX AND THE LIST OF ERATOSTHENES.

Herodotus states that the Phœnix came from Arabia every 500 years. Tacitus says (*Ann.* VI. 28) : " De numero annorum varia traduntur, maxime vulgatum quingentorum spatium, sunt qui adseverent, mille quadringentos sexaginta unum interiici," and mentions that some said it appeared in the age of Sesostris, of Amasis, and the third Ptolemy, and again in A.D. 34. 660, 600, and 340 years are intervals mentioned in other writers (WA. 306). Ginzel (GH. I. 177) refers to the following ancient authorities: Ovid, *Metam.* XV. 402; Mela, *de Situ orb.* III. 9; Seneca, *Epist.* 43; Aelian, *Nat. anim.* VI. 58; Philostratus, *Vita Apollon.* III. 49; Horapollon, *Hierogl.* I. 35; Aurelius Victor, *de Cæsar* IV. 14; Epiphanius, *Ancyr. c.* 85, all giving 500 years: Martial, Lactantius, and Claudian, giving 1000 years; Solinus giving 540, and Tzetzes 7006 years. 500 years is clearly the most usually quoted period.

Until the actual year the priests were doubtful whether the Phœnix would appear in 34 A.D. This suggests that their expectation of its appearance was based on calculation and that the differences of opinion were due to uncertainty as to whether their calculation was right. The most probable hypothesis is therefore that the Phœnix denoted the commencement of some astronomical cycle. Now in Ptolemaic Astrology and the European Astrology derived from it, the cycles to which the greatest importance was paid were the cycles dependent on the conjunctions of Jupiter and Saturn. It is an easy matter to test whether there is a possibility of connection between the Phœnix and these

cycles by calculation whether such a conjunction occurred in 34 A.D., the year specifically mentioned by Tacitus. In that year Jupiter rose in conjunction with Saturn, Jupiter's rising occurring about 11th August and Saturn's on 20th August. This was the nearest rising to Spica in the 119-120 year cycle of conjunctions. 120 years later in 154 A.D. Jupiter rose on 22nd September and Saturn on 19th September. This fell in the reign of Antoninus Pius, who according to Meyer had the Phœnix on his coins. This strengthens the probability that these conjunctions were of significance.

It is also to be noted that on an obelisk erected by Queen Hatshepsut of the Eighteenth Dynasty is the inscription (BB. XII. 17), "I make these things known unto those who will come into being during the *double hen* period," which Budge explains is a period of twice 60 years. It is usually supposed that this *hunti* period of about 120 years was of importance because it represented the time taken for the Wandering Calendar to change position to the extent of one month, but that does not explain the idea of doubling. Doubling is, however, an essential component of the Jupiter-Saturn 119-20 year conjunction (since similar conjunctions occur at 60 year intervals though not quite so close to the date of rising of Spica in the alternate conjunctions).

Now, though at 119 or 120 years' interval there are important conjunctions these successive conjunctions are not all equally near Spica. It is only roughly at intervals of 800-900 years that they are specially close. Such conjunctions would be therefore very important. On calculating the years of their occurrence it is found that they were 5149, 4295, 3263, 2409, 1614 (or possibly 1496-5, according to whether the conjunction rising nearest the date of Rising of Spica or that nearest in longitude is preferred) and

582 B.C. Now it so happens that 3263 B.C. is exactly fixed by the Kahoun papyrus[38] as the 18th year of Senousrit III., that he is mentioned by Thothmes III. as instituting the "Festival of the Beginning of the Seasons" on the very date of the calendar when Spica rose in conjunction with Jupiter and Saturn, that Tacitus mentions a Sesostris in connection with the Phœnix and that Eratosthenes in his list of kings gives "Semphrutraces, qui et Hercules Apocrates 18."

The coincidence is interesting and suggests that the list of Eratosthenes is more valuable than has been supposed. Syncellus gives Eratosthenes' list of 38 kings stated to have been taken by the latter direct from Egyptian records. He calls them Theban kings but a glance at the names shows that some of them are kings who were not Theban. He has also totalled up the figures opposite their names to 1076 and supposes that the 38 kings ruled 1076 years. It seems to me, however, that he has put two lists together which have no connection with each other. The first nine names are the names of the first nine kings from Menes in succession with their supposed lengths of reign. From that point on the list is of quite a different character. It does not give the names of kings who immediately succeeded one another but at first sight appears to be giving the names of kings picked at random at intervals from the time of the First Dynasty onwards. But it is not the custom for chronologists to pick names of kings at random and if a selection of kings' names is made there is usually a reason for it. In this case the selection is not due to local bias for almost every dynasty is represented on to the 13th and further, nor is it due to pride of ancestry or the attempt of some king to include among his ancestors only the most famous kings for some of the kings mentioned are unimportant and some

important kings are omitted. But there is a reason. It will be noted that where the kings can be identified the figures given after their names are, with two exceptions, less than the known length of their reigns from other sources. It will also be observed that at certain portions of the list the kings appear to be roughly about 120 years apart if Manetho's figures for the lengths of reigns are regarded as approximately correct. It occurred to me, therefore, that what this list from Anoyphes (Onenophes) onwards represents is the dates (in terms of the kings' years of reign) of conjunctions of Jupiter and Saturn which occurred closest to the heliacal rising of Spica in each 119 year cycle of conjunctions.

While it is only on an average about once in 900 years that the conjunction is close to Spica, there are two occasions in each 119 years when the ordinary conjunction (occurring once in 20 years) is closer to Spica than at other portions of the cycle, one of these two being closer than the other. The period of 119 years is also in another respect significant for Mercury has an average advance of only 31 degrees in longitude in its 119th year representing a difference in date of heliacal rising of only about 10 days, so that each 119 year cycle presents the same sequence of risings of Jupiter, Saturn and Mercury with only a slight variation. The interval might sometimes however be only 60 years and sometimes as much as 179 years and sometimes there would be no rising near Spica at all.

Let us see then how this theory of the 119 year cycle tallies with the other evidence. The approximate date of Onenophes is already known from the Palermo Stone[5] and we may therefore begin with the conjunction most closely tallying with that evidence and carry on our list to Semphrutraces.

Eratosthenes' List	*Year of Conjunction*	*Date of Rising of Spica*	*Date of Rising of Jupiter*	*Date of Rising of Saturn*	*King's Name acc. to Manetho*	*Date in my Chronology*
Anoyphes	20 5447	25th Aug.	17th July	19th July	Oenophes	5467-5444
Sirius	18 5328	25th Aug.	24th July	30th July	Boethus	5345-5307
Chnubus Gnurus	22 5149	26th Aug.	26th Aug.	23rd Aug.	Chaires	5163-5146
Ranosis	13 5030	27th Aug.	7th Sept.	6th Sept.	Necherophes	5042-5014
(Biyris	10 4593	30th Aug.	17th July	20th July	Bikheris	4602-4580)
Saophis Comatus	29 4852	28th Aug.	9th Sept.	19th Sept.	Sephouris	4884-4854
Senraophis 2nd	27 4792	29th Aug.	29th Sept.	25th Sept.	Soris	4818-4789
Moscherus Heliodotus	31 4534	30th Aug.	19th July	21st July	Userkheres	4564-4551
Musthis	33 4415	31st Aug.	22nd July	3rd Aug.	Menkheres	4447-4438
Pammus Archondes	35 4295	31st Aug.	30th Aug.	26th Aug.	Phios	4330-4277
Apappus Maximus	100 4176	1st Sept.	12th Sept.	8th Sept.	Phiops	4276-4176
					Lists or Monuments	
Acheseus Ocharus	1 4057	2nd Sept.	22nd Sept.	20th Sept.	Uazkara	4057- ?
Wife of Nictor	6 3938	3rd Sept.	1st Oct.	4th Oct.	Neitaqert	3942-3922
Myrtaeus Ammonodotus	22 3680	4th Sept.	12th July	23rd July	—	3701-c.3670
Thyesimares Robustus	12 3501	5th Sept.	11th Aug.	17th Aug.	Dedkere Shema	3512-c.3491
Thirillus	8 3382	7th Sept.	24th Aug.	28th Aug.	Neferkere-Tereru	3389-c.3380
Semphrutraces	18 3263	8th Sept.	6th Sept.	9th Sept.	Senousrit	3280- 3242

It will be seen that from Anoyphes to Apappus Maximus with the exception of Biyris whose name is quite out of position if equivalent to the Bicheris of Manetho, the dates given by Eratosthenes are found to tally closely with the dates given by Manetho using direct reckoning from the Palermo Stone in the first series from Anoyphes to Senraophis 2nd and dating Moscherus Heliodotus to Pepi II. using Manetho's measures with modifications from Pepi I. who is fixed by the Sed[84] or alternatively Zet Festival monumentally dated. (If the record is of a *Zet* Festival, which is otherwise known to be probably a conjunction of Jupiter and Saturn, it can, owing to the date in the Wandering Calendar given, be no other date than that of the very conjunction to which Eratosthenes' list refers. If it is a Sed Festival, there are only 3 possible dates within 5000 years of which the date here given is one.)

As when there are coregencies Manetho usually counts from the first year of one king to the first year of his successor, in the case of Chnubus Gnurus there is a discrepancy of 7 years, and in the case of Sephouris a discrepancy of 4 years, while in the case of Senraophis 2nd I have had to postulate that a king preceded him with a reign of 10 years, and Userkaf's reign is regarded as having begun only 13 years before that of Sefres though Manetho gives the interval as 28. (The spacing on the Palermo Stone seems to be more in keeping with my figures in these cases than Manetho but I will not press that point here.)

At the very outside then, excluding Biyris from the computation, there are dates in 10 kings' reigns all tallying within 10 years (and the majority exactly) with conjunctions of Jupiter and Saturn of which the chance is at least as remote as 1 in 59. Thus the chance of such coincidence as there is, is really much more remote than $(\frac{58}{59})^{10}$ that is to

say very remote indeed. It may be argued, however, that the equivalence of the Eratosthenes' names with those in Manetho is not well fixed and therefore that I must include only those which can be definitely identified. There will surely be few who will deny the identity of Anoyphes with Onenophes, of Sirius with the Buto Man, Zer Atoti (Sirius Thoth), of Moscherus Heliodotus with Userkheres, the priest of the Sun God, of Musthis with Menkheres and of Pammus and Appappus with the two Pepis. The chance of only 6 coinciding within 10 years is ([illegible])^6 which is roughly 1 in 659.03. Thus the probability that the list is indeed a list of conjunctions only works out on this basis at .998+ which is far from certainty.

But it is to be remembered that I am being generous not only in excluding so many kings from the computation but also in allowing a margin of error of 10 years each way for all the kings, since the interval between the two Pepis tallies exactly.

The probability is I think further strengthened by the fact that Cheops asked[17] when the "ipwt" of the "wnt" of Thoth (identified otherwise with Sirius) would be and was told it would be in the reign of Userkaf. The next great conjunction (after Cheops' time) rising near the date of rising of Sirius as the table shows did in fact fall in Userkaf's reign.

Eratosthenes also makes the very remarkable comment in regard to Apappus Maximus "100 years less 1 hour." As Weigall has shown there is some probability that the regnal years were reckoned in terms of the calendar year. Now the rising in conjunction in 4176 is the only one near Spica in the whole of historic time which took place about the last day of the Wandering Calendar.

As in addition to the above factor the identifications of the other kings given do not seem unreasonable and the

great conjunction in the reign of Senousrit III. is otherwise checked, I trust readers will agree that a strong case is made out for assuming that Eratosthenes' list from Anoyphes onwards is in fact a list of these great conjunctions. It will be noted that each series begins near Sirius and passes Spica and is abandoned after it rises about a month after Spica, the conjunctions not being listed again till the next series begins near Sirius.

We may therefore fill in as I have done above hypothetical dates for kings whose position is not given by Manetho, and if we assume that Eratosthenes has given the names in correct order the probability is that the dates are as stated with a possible variation either way of 60 years. (Since in the series to Pepi II. 1 of 11 was out of position we have to face the possibility that there is such an error later, though the probability of any particular king being out of position is 10 to 1 against).

In passing it is of interest to note that the real name of Osiris was said to be Onnophris and this may be another rendering of the name Onenophes, apparently a king of some importance as the list of great conjunctions commenced with him.

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We may now proceed to consider the remainder of the names in Eratosthenes' list—kings of the Thirteenth and Fourteenth Dynasties. Their identification is much more precarious than that of the earlier kings for Manetho does not give us any names and the rendering of the names on the Turin papyrus is more difficult to connect than their equivalent Graecised names from Manetho would have been. The following are my suggested identifications and dates:

Eratosthenes' List	*Year of Conjunction*		*Date of Rising of Spica*	*Date of Rising of Jupiter*	*Date of Rising of Saturn*	*King's Name in Turin Papyrus*	*Date in my Chronology*
Chuter Taurus	7	3144B.C.	9th Sept.	18th Sept.	23rd Sept.	Khu Taui Ra	3180-3142
Meures Philoscorus	12	3025	10th Sept.	30th Sept.	4th Oct.	Fuabra Hernat	3037-3018
Chomoephta	11	2906	11th Sept.	12th Oct.	18th Oct.	Kesekhemre Neferhotpe	2908-2896
Anchunio-Sochus Tyrannus	60	2826	11th Sept.	17th July	19th July	Kheneferre Sobkhotpe	2886-2821
Penteathyris	16	2707	12th Sept.	26th July	31st July	? Punnse-tintsept	2723-2705
Stamenemes 2nd	23	2647	13th Sept.	16th Aug.	15th Aug.	?	
Sistosichermes	55	2528	14th Sept.	29th Aug.	29th Aug.	Seuar . . . . . . re	2582-2520
Maris	43	2409	14th Sept.	11th Sept.	13th Sept.	Men . . re	2451-2400
Siphoeas	5	2340	15th Sept.	1st Oct.	26th Sept.	— — —	— —
— —	14	2290	15th Sept.	23rd Sept.	27th Sept.	— — —	— —
Phruron, hoc est Nilus	5	2171	16th Sept.	5th Oct.	10th Oct.	Fuibre	2175-2168
Amuthantaeus	3	2052	17th Sept.	18th Oct.	22nd Oct.	— — —	— —

If the Turin Papyrus length for the Twelfth Dynasty is right then the conjunction of 3144 B.C. fell in the 37th year, not the 7th year of Khu Taui Ra and Eratosthenes' figure is wrong, but there is just a possibility that it may be the Turin Papyrus that is in error, for in Eusebius' version of Manetho the total of the Dynasty is stated as 245 years, and the kings after Amenemhet III. as reigning 42 years which would bring the end of the Dynasty very near 3151 B.C., which Eratosthenes' figures would give as the first year of Chuter Taurus, or the Turin Papyrus may reckon his accession from the date of his marriage to Sebeknefrure while Eratosthenes may reckon from her date of death.

As Manetho gave the length of the Thirteenth Dynasty as 453 years and it therefore ended about 2727 it follows that the first 4 names above all belong to kings of the Thirteenth Dynasty. The identifications suggested seem the most probable. Fuabra Heruat "was deemed to be identical with the divine son of Osiris" and his name Neferkhen meant "the Good-one in his Ascensions" according to Weigall. His 12th year therefore ended in 3025 B.C. and his first year began in 3037.

Chomoephta I equate with Ka Sesesh Ra of the Karnak list who, I suggest, is Kesekhemre Neferhotpe of the Turin Papyrus, whose Reed and Hornet name meant "ascending in the Power of the Sun God" (Weigall). The remarkable ceremonial carried through in the 2nd year of his reign with reference to Osiris rather suggests that Eratosthenes' figure 11 is here an error. I equate his 2nd year with 2907-6.

An-Chuni (Khene)-o-Sochus (Sobkh) may quite easily be Kheneferre Sobkhotpe, especially as he has left many evidences of his reign in keeping with a period of rule exceeding 60 years. Parts of two sphinxes were found at Aphroditopolis, the region dedicated to Hathor, and his son was called Son of Hathor, perhaps in consideration of the

fact that the nearest rising to Spica (Hathor) in 119 years occurred in his reign.

The Fourteenth Dynasty lasted 484 years, from about 2727 to 2243 and therefore the next 6 kings in Eratosthenes' list belonged to it. The Turin Papyrus is very fragmentary here and the identifications are merely possibilities. The conjunction of 2409 is represented on the oblong Denderah Zodiac.[85] The date 2290 falls in the reign of the Hyksos Sanati who was said by Josephus to have ruled after the conquest of Timaios. Timaios may therefore be the king missing from Eratosthenes' list here. The last two names must belong to Thebans after the time of the Fourteenth Dynasty.

. . . . .

Though Eratosthenes' list goes no further it is useful to examine the dates of the great conjunctions of the next cycle and ascertain whether any of them were anywhere recorded. From this point till the time of the Eighteenth Dynasty records are very scanty. The first conjunction apparently referred to is that of 1793 B.C. and a list may therefore be framed from that conjunction onwards.

Year of Conjunction	*Date of Rising of Spica*	*Date of Rising of Jupiter*	*Date of Rising of Saturn*	*Monarch's Regnal Year*	
1793 B.C.	19th Sept.	19th Aug.	16th Aug.	Opehtiset Nubti	
1674	20th Sept.	2nd Sept.	2nd Sept.	Zeserkare	9
1614	20th Sept.	23rd Sept.	15th Sept.	Hatshepsut / Thothmes III.	2
1495	21st Sept.	5th Oct.	28th Sept.	Akhenaten	6
1317	23rd Sept.	8th Oct.	13th Oct.	Merenptah	
1198	24th Sept.	22nd Oct.	26th Oct.	Ramses IV.	2

As it so happens there are preserved inscriptions or scholastic comments which may have a reference to every one of these conjunctions. Thus the 400th year of the Era of Nubti[86] is apparently dated from the 1793 conjunction beginning from the following year. The date of Spica's rising in 1674 B.C. is recorded in the Ebers Calendar[87] which probably was drawn up because of the special

importance of the year owing to the Great Conjunction. Thothmes III. in his second year (which is known to be 1614 from other evidence in his reign) made preparations for the "Festival of the Beginning of the Seasons." As we have seen he also referred to Senousrit III. as having celebrated the same event. In 1614 as in 3263 the Great Conjunction took place very near to Spica's Rising. It is possible that at all the Great Conjunctions the "Festival of the Beginning of the Seasons" was celebrated but those nearest Spica were as stated above obviously of greater importance. In Akhenaten's 6th year there was a great commotion in religious circles and the king was regarded as a heretic. The reason the 6th year was climacteric may have been owing to the non-attendance of the king at the great ceremony of the Feast of the Beginning of the Seasons which was being celebrated by the priests of Ammon. The Great Conjunction of 1317 fell in the reign of Merenptah. In later times there was an era known as the Era of Menophres. Theon of Alexandria[46] thought this indicated the time when Sirius rose on 1st Thoth and calculated the date as 1322 B.C. It is a remarkable coincidence, however, that in the year 1317 the fixed and wandering calendars coincided and at the same time it was a year of the Great Conjunction. The Great Conjunction in the second year of Ramses IV. was the occasion of special offerings by the Pharaoh. What is probably a calendar of star risings[47] for this year has been preserved in the tomb of Ramses VI., and also in the tomb of Ramses IX. (CA. II. 218).

(The Twenty-first Dynasty happened to be ruling during a period when there were no conjunctions near Spica. Instead we find them celebrating conjunctions occurring in fixed Khonsu.)

The following are computed (approximate) dates of Great Conjunctions in the next series.

Year of Conjunction	Date of Rising of Spica	Date of Rising of Jupiter	Date of Rising of Saturn	King's Reign
880 B.C.	27th Sept.	17th Aug.	18th Aug.	Osorkon I. Takelot I. Osorkon II.
760	27th Sept.	27th Sept.	16th Sept.	Piankhi
700	27th Sept.	18th Oct.	29th Sept.	Shabataka
582	28th Sept.	30th Sept.	3rd Oct.	Apries
463	28th Sept.	13th Oct.	16th Oct.	Artaxerxes
344	29th Sept.	26th Oct.	30th Oct.	Nectanebus
225	29th Sept.	7th Nov.	11th Nov.	Ptolemy III.

A Zodiac[52] happens to be preserved for the exact date of Spica's rising in the year of the first conjunction of the series 27th September 880 B.C. and the conjunction of 760 may be that referred to on the Piankhi[56] stela. The Risings of 700 B.C. were the occasion of the coronation[58] of Shabataka. The conjunction of 582 is one of the greatest conjunctions nearest Spica. This may be the conjunction Tacitus refers to as in the reign of Amasis, who was, however, not crowned as king till 569 B.C. It may be that as Apries was detested and was possibly not of royal descent (AE. 1923. 58) events of his reign were sometimes regarded as in that of Amasis, which would be antedated to begin at the end of the reign of Psamettichus II.

No record remains of the conjunctions of 463 and 344 but the last of the series, that of 225 B.C., occurred in the reign of Ptolemy III., who is also mentioned by Tacitus in connection with the Phœnix.

The following are some conjunctions of the next series.

Year of Conjunction	Date of Rising of Spica	Date of Rising of Jupiter	Date of Rising of Saturn	King's Reign
145 B.C.	30th Sept.	7th Aug.	3rd Aug.	Euergetes II.
26 B.C.	1st Oct.	21st Aug.	20th Aug.	Augustus
34 A.D.	1st Oct.	11th Aug.	20th Aug.	Tiberius
154 A.D.	2nd Oct.	22nd Sept.	19th Sept.	Antoninus Pius

The first of these is possibly referred to in an inscription in regard to a festival of Euergetes II. on the 15th of

the 11th month. The conjunctions of 34 A.D. and 154 A.D. have been discussed above. No record remains of the conjunction of 26 B.C.

. . . . .

Having listed the conjunctions it is now possible to see how the different ideas of the length of the period arose. Thus a complete series from Anoyphes 20 to Senraophes 2nd 27 (5447-4792) comprised 655 years, which is close to the 660 figure. The second series from Moscherus Heliodotus 31 to wife of Nictor 6 (4534-3938) comprised 596 years which is close to the 600 figure.

On the other hand from a conjunction in one series to the corresponding conjunction in the next series, *e.g.*, Apappus Maximus 100 to Semphrutraces 18 (4176-3263), might be as in this example 913 years; or 973 years, *e.g.*, Chubus Gnurus 22 (5149) to Apappus Maximus 100 (4176) which is close to the 1000 year estimate of Martial and corresponds almost exactly to the 972 years of which Hesiod regarded the Phœnix period as a multiple (TM. 54).

Again the interval from the conjunction nearest Sirius to the conjunction nearest Spica, *e.g.*, Myrtaeus 22 to Semphrutraces 18 (3680-3263) was in this example 417 years and in later times when Spica and Sirius rose further apart, might be 477 or 536 years, thus giving rise to the notion of a 500 year or 540 year period.

NOTE 10. THE THIRD DYNASTY.

(AFRICANUS' SECOND.)

This is apparently a dynasty of kings ruling principally from the north (in contrast to the previous dynasties) with their capital at or near Abydos. The date of Binothris is estimated from the astronomical evidence on the Palermo Stone[5] and therefore if Manetho's figures are accepted for Kaiechos and Boethus, the dynasty commenced in 5345. If Boethus is the Sirius of Eratosthenes this date is confirmed for there was a great conjunction of Jupiter and Saturn in 5328 B.C., in his 18th year. It was close to Sirius. He is probably the Zoser of the lists and also the Zer whose ivory label was found by Petrie, who thinks it indicates that he was active at Buto in the Delta. Possibly Manetho's name for him Boethus is due to this fact. The label shows the Hathor cow with the symbol of the Sothis, Spica, in its horns and also the sign of the first season. Borchardt thinks he sees faint traces of two strokes to indicate the 2nd month. Spica rose about the last day of the 2nd month in the first 3 years of his reign but about 5342 it rose on the first of the 3rd month and possibly there is an indistinguishable third stroke.

This Zer (or Zeser) is clearly regarded as the founder of a new dynasty in the Turin papyrus, his name being written in red (PE. 1. 28). He was possibly also the king who erected the ziggurat which Cheops converted into his great pyramid.[14] Its southern tunnel, before the pyramid top was put on, was directed to the point of the heavens where Sirius daily transited the south meridian.

Through the dark tunnel Sirius, the brightest star in the sky, would easily be seen even in the daytime.

Zet-Ata, presumably coregent with Zer-ta during part of his reign, is probably the Zet whose sealings were found in a mastaba tomb at Gizeh (P.E. 1. 18), the Zet-Ata buried at Abydos being Zet-Ata of the First Dynasty.

There are 8 years of Uothnes on the Cairo fragment but there is no information as to any record of "births" on any of these years to enable me to fix them astronomically. The distance of the Cairo fragment from the Palermo Stone is, however, known owing to the astronomical evidence on the above two lines and if Sethenes' last year was 5164-63 the year spaces from Binothris to Sethenes would average 7.33mm. which compares with 7.51mm. and 7.35 to 7.45 estimated by Borchardt and Daressy respectively from measurements of the few years on the fragments. This necessitates reducing the reign of either Tlas or Sethenes by 2 years. This reduction also brings the addition of the regnal years of the dynasty into conformity with Africanus' stated total of 302 years.

There were evidently coregencies here for the stone shows a portion of the name above the first two spaces. As the name was probably fairly near the centre of a king's reign there would only be 6 years before and after his name and at most about 6 below it implying a reign not exceeding 18 years. Tlas must have been coregent, therefore, at least till 5181.

Chaires is possibly the Chnubus Gnurus of Eratosthenes. In 5149 the rising of Jupiter and Saturn in conjunction took place nearer the rising of Spica than it did again till 4295 B.C. If Eratosthenes' figure 22 is correct he must have been coregent with Sethenes from 5170 for 5149 would only fall in the 15th year according to the Palermo Stone.

NOTE 11. THE FOURTH DYNASTY.

(AFRICANUS' THIRD.)

The end of Mesochris' reign and beginning of that of Souphis occur on the Palermo Stone[5] and are fixed. Reckoning back with Manetho's figures the dynasty began in 5042 and Cheneres' reign, therefore, probably extended by some months into that year, for the date 5042 is checked by the evidence of the list of Eratosthenes[7] which shows the occurrence of the great Jupiter Saturn conjunction in the 13th year. The conjunction occurred in 5030 B.C. The 1st of the 1st month Hathor then fell early in April and probably the regnal years were reckoned from the beginning of the civil year, so that the dynasty would be reckoned as beginning in April 5042 B.C.

Eratosthenes' figure for the conjunction in the 29th year of Saophis Comatus does not quite tally for the conjunction was in 4852 B.C. which would give 4880 as his first year, whereas Manetho's figures give 4884.

It was probably in this Snofru's reign that Methen (whose biography is recorded BR. I. § 170ff.) died.

There are dates of quarrying on stones of Snofru's pyramid which are considered along with other Seasonal Dates.[30]

Note 12. THE ECLIPSE OF NECHEROPHES.

According to Manetho in the reign of Necherophes, the first king of the "Third Dynasty" of Africanus, the Libyans revolted from the Egyptians but "alarmed by an unexpected increase of the moon submitted." It has been suggested that this describes the rising of the moon in eclipse.

Calculation shows that it is probable that when the moon rose about 6.10 p.m. on the evening of 20th October (Julian) 5039 B.C. it was coming out of eclipse. This date, which falls in the 4th year of Necherophes, may have been the date of the revolt.

NOTE 13. THE SET REBELLION.

Weigall would like us to believe that the great Set rebellion which is recorded in the Horus Temple at Edfu took place in the reign of Binothris. Newberry, however, has given very good reasons (AE. 1922. 40) for supposing that it took place about the time of Khosekhemui.

Sealings of Khosekhemui (whom I identify with Mesochris) and Neterkhet Zoser (whom I identify with Tosertasis) were found together in the Shunet el Zebib at Abydos. In Khosekhemui's tomb, his queen Hapenmaat is called "mother of the king's children," and in Zoser's tomb she is called "mother of the king" so probably Tosertasis was a son of Khosekhemui.

The Ptolemaic inscription at Edfu shows Zoser's vizier Imhotep "reading from a scroll as though he were actually reading a record of the war written in the lines of inscription in front of him." In front of Imhotep is a priest cutting up a hippopotamus, symbolical of the Set tribes. The inscription records the war, mentioning that the Horus king was with his army in Bow-land (Nubia) suppressing a rebellion there when the Set rebellion broke out in the 363rd year of Horakhuti ("Horus of the Horizon").

Now at Hierakonpolis there are 6 monuments of Horus Khosekhemui of which 5 record victories over rebels of the north. Also on a fragment of a stele his conquest of Bow-land is recorded. Not only so, but in the later part of his reign he was called the Horus-Set king showing that the two tribes were once more united under one ruler, and his son Zoser was the first king to take the special royal title

applied to subsequent kings which the Rosetta Stone translates "victorious over his enemies."

The Era by which the event is dated must be either from the commencement of a Sothiac cycle or from a Great Conjunction of Jupiter and Saturn (as in the case of the stela of the year 400 in the time of Ramses II.). Reference to the chronology shows that the latter is the case. A Great Conjunction occurred in the 18th year of Sirius (Zer-ta) 5328 B.C. The 363rd year from that is 4966-4965 which is the 13th year of Khosekhemui, the very year in which the Palermo Stone records that a statue was made of the king, possibly to commemorate this great victory. (Though the Rising of the planets in conjunction in 5328 was in July they would be near the meridian at midnight on the date of the Winter Solstice which appears to have been denoted by Re Hor Khouti.)

NOTE 14. THE GREAT PYRAMID.*

The Great Pyramid of Gizeh has been a source of wonder and admiration for thousands of years and many extraordinary theories have clustered round it with the passage of time. The best known of these theories is that of John Taylor as elaborated by Professor Piazzi Smyth, who was Astronomer at the Calton Observatory, Edinburgh. His view was that the relation of height to twice the breadth of the base was intended to represent the ratio of the diameter to the circumference of a circle and that the measurements of the various passages symbolised different periods of time in the world's history measured from the date of building of the Pyramid, which on astronomical grounds he assigned to 2170 B.C. No Egyptologist to-day concedes so late a date for the building and the astronomical evidence of the Pyramid must, therefore, be interpreted differently.

According to Herodotus the Great Pyramid was built by Cheops: according to Manetho it was built by Suphis, the second king of his Fourth Dynasty: the name Khufu with the date of the 17th year "is found repeatedly written in red paint on the blocks of masonry above the King's Chamber" in the Pyramid (PE. i. 60). A Cheops also reigned according to the Turin Papyrus before (or partly contemporary with) Chephren the last king of the Third Dynasty. The Cheops of Herodotus, Suphis, and Khufu are probably one and the same person who must have lived about the time of the building of the "King's Chamber." (Perhaps the Cheops of the Turin Papyrus is Khnum Khuf.)

* See Plate II.

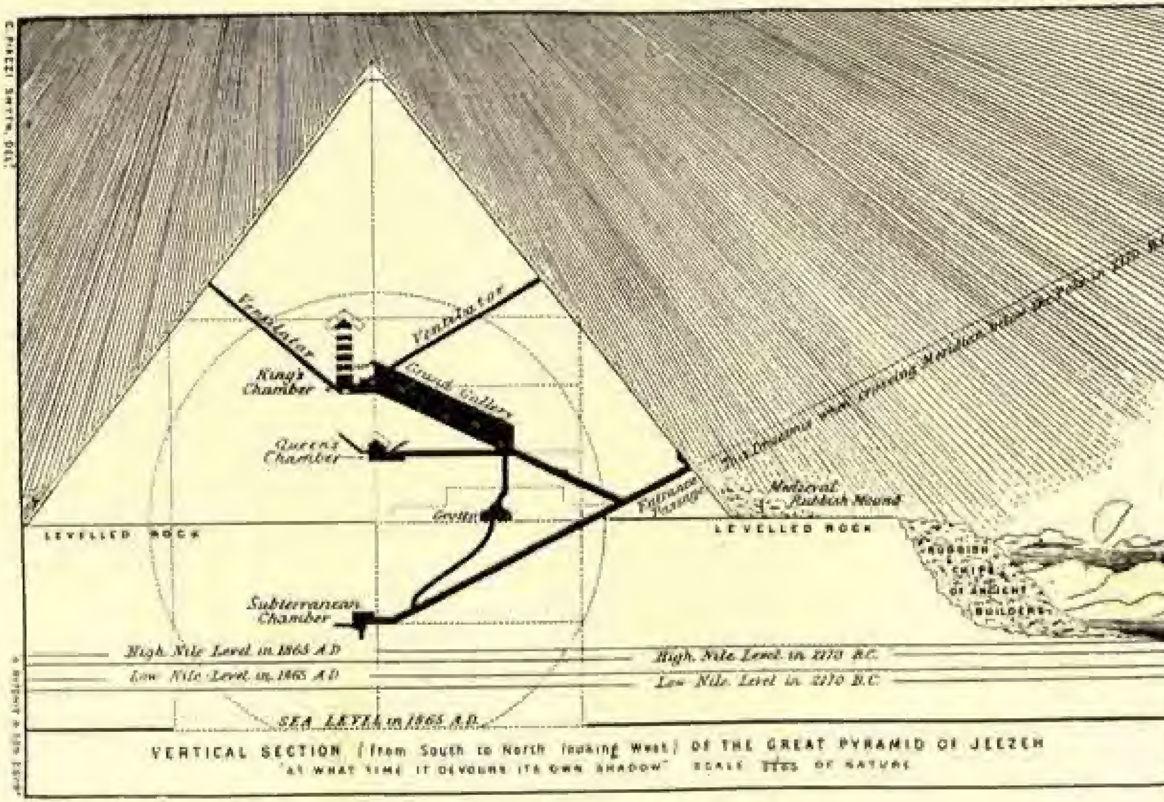

PLATE II. THE GREAT PYRAMID.

Reproduced from "Our Inheritance in the Great Pyramid,"
by C. Piazzi Smyth (Burnet & Co., 1890).

See Note 14.

(*facing page* 92)

The portion of the Pyramid below the King's Chamber must have been built at or earlier than the time of Cheops. If, therefore, the date of building of the Pyramid can be established it will afford a clue to the date of the Fifth Dynasty.

The most complete study of the astronomical evidence is that given by Proctor (PP.). While not accepting all the pyramidal theories of Piazzi Smyth he thought there was little doubt that one purpose served by the Great Pyramid was astronomical. Its position is 29° 58′ 51″ N. almost exactly in a latitude of 30° (PP. 99) and its sides are oriented carefully pointing North, South, East, and West with an error of only 4½ minutes of arc. There was a tunnel running from the north face of the Pyramid downwards into it at an angle inclined from the horizontal about 26° 17′ to 26° 28′. This tunnel was about 4 feet high 3½ feet broad and 82 feet long to a point where its continuation downwards could be blocked with a plug. At this point an ascending passage southwards at an angle inclined about 26° 18′ commenced. After about 127 feet (PP. 124) the ascending passage opened out into a Grand Gallery permitting a view (before the top of the Pyramid was built over it) of the meridional passage of all stars with an elevation higher than 26° 18′ up to a slight distance below the zenith.

Proctor assumes that α Draconis shone down the northern tunnel when transiting the lower meridian and that α Centauri shone down the southern tunnel. But to use the words of Piazzi Smyth quoted with approval by Proctor "no observer in his senses in any existing observatory when seeking to obtain the time would observe the transit of a circumpolar star for anything else than *to get the direction of the meridian to adjust his instrument by.*" In other words so far as northward observations were

concerned the tunnel was of no use after the Pyramid was built. Proctor, therefore, assumes that this tunnel was used to obtain true north and south when building the pyramid and supports his contention by pointing out that the situation of the pyramid was probably intended to be in latitude 30°, that it is a little south of this which would be the case if no account of refraction were taken when estimating latitude by means of the elevation of a star near the pole. The other method of estimating latitude by the Sun's shadow he argued would have led them into the error of placing the pyramid somewhat north of latitude 30°.

This argument presupposes an extraordinary accuracy of observation on the part of the Egyptians and very deep knowledge of astronomical theory implying ignorance only of the influence of refraction even when observing heavenly bodies at high elevations. It is true that other evidence is all in favour of a high degree of accuracy on their part and considerable theoretical knowledge. But as their orientation was in error by 4½ minutes of arc we need not be surprised at an error of only 1' 9" in their estimate of latitude. If the observation to determine latitude were made at the southing of the Sun on the day of the Vernal Equinox, the Sun might happen to be 1 hour distant from the Equinoctial point at 12 noon in the year in question. This would make a difference of about 1 minute in their estimate of latitude (and Kugler argued that the Babylonians did not know the position of the Equinoctial points and solstices closer than within about 4° representing the apparent movement of the Sun in 4 days!) The actual position of the centre of the base (PP. 88) is 1 mile 568 yards south of the 30th parallel. "This is 944 yards north of the position they would have deduced from the pole-star method, 1 mile 1683 yards south of the position they would have deduced from the shadow method, and 1256 yards south of the

mean position between the two last named." It will be seen, therefore, that it is not because the Pyramid is in the exact position deducible from the pole star, but because it is nearer it that he favours the view that it was used. But it may be pure coincidence that the Pyramid is slightly south. As we have seen another source of error besides refraction enters into the computation from the Sun's position and we have no right to assume that the error of placing would necessarily be less than 1 mile 1693 yards. The decision as to the placing of the Pyramid was also surely made before this tunnel was built.

Assuming, therefore, that the northern tunnel points to a star near the pole, Proctor, like Piazzi Smyth, finds α Draconis the only bright one (between 2,000 and 4,000 B.C.) which would cross the meridian in view of an observer looking up the tunnel, and that the only periods when it would do so would be about 2170 and 3350 B.C. (PP. 100). He then proceeds to ascertain whether the southern passage pointed at any star at either of these periods and finds that about 3300 B.C. it pointed at α Centauri (PP. 124). He, therefore, concludes that that is about the date of the building of the Pyramid.

(Professor Lowell apparently repeated Proctor's theories in the *Popular Science Monthly* for June, 1912 giving the date, however, as 3430 B.C. He also mentioned that the midwinter Sun would be visible near the bottom and the midsummer Sun near the top of the Grand Gallery. Nicklin appears to understand this as meaning that this condition was present in 3430 B.C. only (NE. 12) but in point of fact the elevation of the Sun at the Solstices remains almost the same for many centuries being affected only by the minute change in the obliquity of the ecliptic and by a change, if any, of the geographical position of the poles of the earth's axis. It was at no period in historic time

precisely of an elevation at the solstices to be seen exactly at the extreme top and extreme bottom of the Grand Gallery.)

It seems to me strange, however, that a tunnel was purposely pointed at a star, which, however useful before or during building, was quite useless after the observatory was completed, especially as so far no Egyptian texts have been translated indicating any special interest on the part of the Egyptians in α Draconis.

I accept the theory that it was intended to erect the Pyramid in latitude 30° north, though with some hesitation; that it was intended that the sides of the base should be oriented; and that the Grand Gallery was an astronomical observatory from which the southing of all stars near the ecliptic could be observed.

This being granted, what was the purpose of the two narrower passages? Now Proctor draws attention to the fact that in these narrow dark tunnels α Centauri would be visible when southing in 3300 B.C. in full daylight. But it is clear that if the Egyptians were choosing a southern star for daylight observation they would choose the brightest star in the sky namely Sirius. We also know that in later times Sirius had great importance in the minds of the Egyptians and that in early times Cheops himself questioned[17] Djedi (JEA. XI. 2) in regard to his knowledge of the number of the "ipwt" of the "wnt" of Thoth (Thoth being Sirius). Further in the hieroglyph for the Sothis the pyramid symbol occurs, signifying a measuring star (differing in shape of course from the pyramidal hieroglyphic symbol used to indicate an actual pyramid, in order to avoid confusion). It is also to be noted that after Cheops' time the Great Pyramid was copied (omitting the astronomical observatory) in smaller pyramids which were used as tombs, while Sirius was regarded as the "home of

souls." It was therefore quite appropriate that a sacred Sirius building should be used for burials. Additional light is thrown on the problem by the *Book of the Dead*. This book consists of a number of Chapters, many of which were inscribed in the early pyramids. In these there is constant reference to Thoth (the god of Sirius) bringing the dead up for judgment before Osiris, and the *Book of the Dead* was in later times itself ascribed to Thoth. In the description of the final mystery in Chapter clxi. there is a tortoise depicted crawling across the face of the Sun. Then "Ra, the Sun god, liveth. The Tortoise dieth." Then Thoth opens the entrance to heaven. Now the tortoise in all Egyptian astronomical figures in which it occurs precedes Sirius so we have here a clear picture of a Sirius rite. It is difficult therefore to avoid the conclusion that the most important observations made in the Pyramid were of Sirius and that the ascending tunnel pointed at Sirius when the Pyramid was built.

Now the entrance passage pointed northwards with a similar elevation (about 26° 18′) with which the southern passage pointed south and Proctor pointed out that the plug where the two passages met may have been for the purpose of retaining there a reflective surface of water so that a southern star shining down the southern passage would be reflected up the northern passage (and *vice versa* α Draconis down the northern and up the southern according to his theory).

Now it would indeed be an extraordinary coincidence if a pair of passages each inclined about 26° 18′ and specially made, therefore, to reflect a bright star from one point of the heavens should also happen to reflect a bright star of special interest to the Egyptians in the other direction, and I do not think there is any call to assume that it was so especially as the observation of a northern

star would serve no useful purpose. My view, therefore, is that both passages were for the purpose of observing Sirius. The reflective surface made it unnecessary for the observer to descend to a great depth. All he required to do was to sit inside the entrance in the north face (and shut the door thus shutting out the light behind him, if the observation were made in the daytime) when it would be possible to see Sirius when its elevation was about 26° 18′ to 28° 18′ at southing.

The period when Sirius southed at that elevation was roughly between 5600 to 5100 B.C. (It would be visible in the earlier portion of the period to an eye near the floor and in the later portion to an eye near the ceiling of the passage.) It is, therefore, probable that the lower portion of the Pyramid up to and including the Grand Gallery was erected within that period. When erected the astronomical priests probably did not realise that with the passage of time precession would render the passage useless for the observation of Sirius. When this did occur shortly after 5100 B.C. or 5000 B.C. they might still continue to use the Grand Gallery for night observation as well as the flat top. Then Cheops finally made use of the Grand Gallery impossible by building the King's Chamber and putting on the pyramidal top, blocking the view to the south. He was regarded as impious according to Herodotus who related that he "caused the temples of the gods to be locked up" and Manetho said that he was "arrogant towards the gods."

One can only guess who the builder of the lower portion was. According to Budge the Sixty-fourth Chapter of the *Book of the Dead* entitled the "Chapter of knowing the Chapter of Coming Forth by Day in a Single Chapter" was ascribed in an early rubric to the time of Semti (Manetho's Semempses). It is possible that in the time of Semempses (5389-5371) the observatory was already

built to note the Coming Forth of Sirius by Day, symbolic of the coming forth of the Souls of the Dead, the religious or funerary rites being conducted at the times of its Coming Forth. (It would take about 7 minutes to transit the aperture.) It may have been built by Onenophes (5467-5444) the first king in the list of Great Conjunctions of Jupiter and Saturn, for Eusebius described him as "qui et pyramidas ad Cochonem erexit" and Africanus also said "Hic circa Cochonem* pyramidas erexit." (SD.) On the other hand another rubric ascribes the Chapter to the time of Menkaura (4660-4597).

Another possible builder is the Buto man, *Zer ta*, or his coregent *Zoser* Athothes (5345-5307) designated Sirius in the list of Eratosthenes.[2] It is a curious coincidence that about that time the longitude of Sirius was not far from the longitude of the Vernal Equinoctial Point. A third possibility is Tosorthros (5014-4985) who according to Manetho introduced building in stone. As there is a margin of error in the computation it is possible that at that period Sirius would be visible to an eye near the top of the entrance passage. *Zeser* Neterkhet the builder of the step pyramid of Sakkarah is not equivalent to Tosorthros but to Tosertasis, since Neterkhet *Zoser* was a son of Mesochris. It is possible, however, that Manetho has confused Tosorthros with the earlier *Zoser* or *Zerta* (his Boethus), or with *Zosertasis* who was the second not the first to build a pyramid (or truncated pyramid).

Of the pyramids of Gizeh Piazzi Smyth has recorded the slopes of seven, Great Pyramid 51°52′, 2nd 52°20′, 3rd 51°, 5th 52°15′, 7th 52°10′, 8th 52°10′, 9th 52°10′. These are all obviously attempts to estimate the same angle.

* According to Budge (BB. ix. 193) Cochome is the Greek transcription of the name of the great cemetery of Memphis called by the Egyptians Ka-qam.

Now it so happens that the latitude of Sirius measured from the South Pole of the Ecliptic was about 52°10′, and it may be that the Gizeh pyramids were intended to symbolise the latitude. Six are within 20′ of the correct latitude and the chance of this happening without intention that it should be so is very remote, *viz.* $(\frac{40}{60 \cdot 11})^6$. While there might be difficulty in estimating the latitude of Sirius, it is not likely that there would be a number of estimates of the value of π. If the angle of the Great Pyramid was such as to yield the ideal relationship between height and base and importance was attached to that the other pyramids would have been given exactly the same angle without variation. But in point of fact though the slope of the Great Pyramid is very near the slope which would give the true value of π (3.1416) the value attached to π by the Egyptian geometricians was 3.16 (A.M.) so it is unlikely that the Great Pyramid symbolised by its height and twice the base the ratio of diameter to circumference of circle especially as when originally built it seems likely that it did not reach its present height. Even when completed it may not have reached the theoretic height for it has a blunt top, and it is purely conjecture that at one time the slopes ended in a point thus giving the measure desired by Piazzi Smyth. My view, therefore, is that the slope symbolised the latitude of Thoth, Thrice Greatest Hermes as the Greeks later translated it. Other pyramids with different slopes would symbolise stars of different latitude, and the obelisk (almost vertical) represented the latitude of the Sun on New Year's Day, which the Egyptians perhaps did not place exactly 90° from the Poles of the Ecliptic, which may to them have signified the track of Jupiter rather than of the Sun.

There is a "design on an ancient engraved gem of a serpent enclosed in a pyramid and surrounded by 5 stars"

(SM. 112). There is a possibility that this refers to Canis Major, of which Sirius is the chief star, Sirius being symbolised by the serpent and βδεζη, the five stars reaching 2nd or 3rd magnitude in the constellation being represented by the five stars in the gem.

It has been argued that the Great Pyramid was all built according to a pre-conceived plan and that the time of building must have been later than the step pyramid of Sakkarah and the pyramid of Snofru. The evidence adduced for the first point is that the smaller passages could not have been inserted after the pyramid was built, being too small for a man to work in, and that there are no cracks where new work is added. I agree that the small passages could not have been inserted after the pyramid was built, but it will be seen that if the first building was to the level of what was later the floor of the King's Chamber (with some additional supporting masonry at the sides of the projecting top of the Grand Gallery) all the lower passages formed part of the plan of the original building and would be constructed during building. Similarly the so-called ventilators formed part of the pre-conceived plan of Khufu or his architect and were built in when the pyramidal top was being built. The argument from cracks in the masonry seems rather far-fetched in view of the size of the blocks used.

The evidence adduced for the second point is that the style of architecture follows a definite sequence. Now it seems to me that sequences can only be established when dealing with objects which are found in large quantities at successive periods under review. By no stretch of imagination can it be said that pyramids were found in large quantities before Khufu. All attributed by Petrie to an earlier date are the step pyramid at Sakkarah, the Meydum Pyramid, and the Dashur Pyramid. The Sakkarah

Pyramid now appears as "a sort of blunt pyramid in six monstrous steps, the total height being nearly 200 feet" (WH. 150). The Meydum Pyramid now appears also as a series of steps but irregular in size up to a height of 124 feet. Sir Flinders Petrie (PE. i. 47) thinks that originally there was an outer casing making it truly pyramidal, and that the casing-stones have been removed by others for building elsewhere. The pyramid at Dashur is still in the form of a pyramid 326 feet high. The Great Pyramid is 451 feet high and believed to have been originally 481 feet.

The theory apparently is that the most perfect example of a pyramid must have followed less perfect examples and that the same constructional methods must have been used with improvements. But obviously no certainty attaches to this theory or all later pyramids which are less perfect should be placed earlier than the Great Pyramid.

Further it was evidently Khufu's builders' practice to put Khufu's name on the stones. It is strange that though the stones in the King's Chamber show his name not a single trace of his name is found on stones in the lower chambers and passages. Also some of the stones in the King's Chamber are dated in the 17th year (WH. 170). It is difficult to believe that within 17 years his workmen could have built all the lower portion of the pyramid, even if we suppose that building began immediately on his accession.

It seems safer, therefore, to rely on the astronomical evidence rather than the evidence from style of building.

The sequence then is seen to be this. The first large stone building was the lower portion of what was later the Great Pyramid. As originally built, it was a flat-topped structure like the Babylonian Ziggurats save that their sides were not oriented to the four points of the compass. Its

outer surface may have been "steps," or it may have been, as is more probable, finished off with a slope. For a long time it was the only structure of the kind in Egypt. Later Tosertasis (4945-4926) conceived the idea of building a pyramid. This was a new idea. Though it appears as a "step" pyramid it may originally have been cased with stones, giving a true sloping surface. No trace has been found of any pyramid by his successor, Aches, but the next king Snofru was in process of building the pyramid of Meydum in his 17th year (4868-67). It may also have been truly pyramidal in shape.

His coregent and successor Khnum Khuf began quarrying stone with a view to making a pyramid for himself, but died before accomplishing his purpose. The first Chephren (Kerpheres) who had been coregent with him was probably still quite young on his death for another coregent, Dedefre, ruled with him for 8 years. He has left no pyramid. Then with the second Snofru a new dynasty commenced (with possibly 10 years of another king's reign intervening). He built the first large pyramid, the pyramid of Dashur. So far as is known he did not make any use of the stones quarried by Khnum Khuf.

Then came Khufu who conceived the idea of converting the old disused Sirius observatory into a pyramid tomb for himself, by continuing the slopes up to their present height, building in the King's Chamber in the process. He also made use of the stones quarried by Khnum Khuf, for Khnum Knuf's name appears as well as his own on the stones in the King's Chamber.

(Then the second Chephren (Khafre) and Menkaura also built large pyramids.)

. . . . .

In this connection one should perhaps also note (A. 1892-391) the theory of G. F. Hardy that the Meydum

Pyramid entrance passage pointed at 126 Piazzi when built and that the date of building of it was therefore c. 3820-3620, but this theory is open to the same objection as the α Draconis theory of the Great Pyramid, namely that north observation was useless. In any case 126 Piazzi is only a sixth magnitude star, and it is only the Great Pyramid, the first built (in part), which has the characteristics of an observatory.

Hardy also noted that three straight trenches East of the Great Pyramid running 13°6′, 24°22′, and 75°58′ East of North and West of South would have pointed to Canopus setting and Arcturus and Altair rising at the same period. But he himself admits that the odds are only "about 90 to 1 against three such stars rising or setting within a degree of three azmiuths taken at random." It is, therefore, not a remote chance that this should have occurred without it being purposed in the layout of the trenches. There is the further factor to take into account, namely, that there is no information whatsoever as to who constructed these trenches.

NOTE 15. THE FIFTH DYNASTY.

(AFRICANUS' "FOURTH" AND "FIFTH.")

Africanus finding himself a dynasty short[8] split the Fifth Dynasty of Manetho into two.

The first king Soris appears to be the Senraophis 2nd of Eratosthenes. The great conjunction took place in 4792. This according to Eratosthenes was his 27th year. As the previous dynasty ended in 4828 there may* have been another king reigning before him 10 years (Eusebius places Cheops third in his list). Senraophis 2nd is probably Snofru 2nd whose name appears on the Palermo Stone.[5] The name Khufu appears also on the stone.

Eratosthenes had Biyris in his list but out of position if Manetho's Bikheris is to be identified with him and is correctly placed. There was a great conjunction in his tenth year 4593 so his first year is fixed as 4602-1. This falls in the reign of Menkaura according to Manetho's figures and the whole of Rhatoises' reign and part of that of Bikheris must have been contemporary with the latter part of Menkaura's reign. In view of the lengths of the reigns of his predecessors Menkaura may easily have been a man of 65 by 4627 and considered it desirable to assume a coregent.

From Seberkheres to the end of Sisires' reign Africanus

* But in the Westcar papyrus (AG. XXV. 47-48) stories are related to Cheops of marvels in the reigns of Zoser, Nebka and Snofru. As Zoser was the founder of the Third Dynasty and Nebka the founder of the Fourth, Snofru was probably singled out because he was founder of the Fifth.

reckons 84 years while the Palermo Stone shows only about 69 as follows:

Shepseskaf	14
(Thampfthis)	2
Userkaf	9
Sahure	22
Nefererkere	15
Shepseskere	7
	69

Differences in individual reigns do not necessarily imply error in view of coregencies, but at some point here Africanus has an excess of 15 years, which I have deducted from his figure for Userkaf. Userkaf, however, must have continued as coregent till 4534, the year of the great conjunction recorded as in his 31st year.

Menkheres II.'s first year is fixed from the great conjunction in his 33rd year (when he was coregent with Tankheres). For him and his two successors by taking the figures of the Turin papyrus the dynasty ends in 4380 after 448 years, the total given in Eusebius' version of Manetho. Onnos however may have reigned on to 4360, for 20 years contemporary with his successor.

. . . . .

A limit to the maximum duration of the dynasty is set by the fact that certain individuals are known to have lived through several reigns.

A royal favourite Mertityotes (BR. I. §189) was "Great in the favour of Snefru, great in the favour of Khufu devoted to Horus, honoured under Khafre." As no mention is made of Dedefre this probably refers to the Snofru, Khufu, and Khafre of this dynasty, not of the preceding one. If she was 20 about 4790 she may have died about 4720 at the age of 90.

A prince Sekhemkere lived from the reign of Khafre to the reign of Sahure (BR. I. §54). Khafre's sole reign ended

in 4660 but he may in his senility have continued as coregent with his successors. Even so Sekhemkere must have been an old man of about 100 when he died. The Turin papyrus reckons that Sahure was coregent with Userkaf after Userkaf's 7th year, *i.e.* from 4557.

Ptahsepses (BR. I. §256ff.) narrates that he was born under Menkure, educated in the reign of Shepseskaf, passed his manhood in the reign of Shepseskaf and five later kings, thus dying under Sisires. (A Ptahsepses was priest in Nuserre's sun temple. Without assigning any reason for his conjecture, Breasted assumes that he was the same Ptahsepses.) The fact that he does not mention Rhatoises and Bikheris shows that Menkheres must have been coregent during the greater part of their reigns. If Menkheres succeeded as a child of 6 in 4670, becoming sole king in 4660 (about 16 years of age at the death of Khafre), he may have died about 4588 at the age of 88, coregents having been ruling with him since 4627.

Ptahsepses may have been born about 4590, "educated" till 4575 and died about 4515 at the age of 75. The fact that he continued in the favour of Userkaf and his successors shows that there was no real change of dynasty here.

Reisner in April, 1927, discovered a new grave east of the Great Pyramid with inscriptions from which Scharff makes deductions as regards the chronology of the "Fourth" Dynasty. (OLZ. XXXI. 73.)

The facts revealed are these. A king's daughter, Meresanch, died on the 21st day of the first month of "Summer" in the first year of an unknown king. A queen, Hetepheres, made a sarcophagus for her daughter Meresanch. This Hetepheres is described as the daughter of Cheops and is also the granddaughter of the queen Hetepheres I., the mother of Cheops and wife of Snofru.

According to Reisner the building of the mastaba of Hetepheres II. began in the 13th year of Chephren. The father of Meresanch was Ka-waab, the eldest son of Cheops, who married his half-sister Hetepheres II.

Thus,

Snofru *m.* Hetepheres I.

x *m.* Cheops *m.* a fair-haired woman.

Ka-waab *m.* Hetepheres II. (fair)

Meresanch

Meresanch married her uncle Chephren. It is supposed that Meresanch died in the first year of Shepseskaf, but even on Meyer's short chronology this would make her 103 years old and her mother (who survived her) about 120. No very good reason is given for the supposition. More probably Hetepheres II. was born about 4740; her daughter Meresanch was born about 4720, married her uncle Chephren about 4700 and died in the first year of Menkheres 4666 (or 4660 beginning of sole reign) when she would be about 54 and Hetepheres II. about 74. The mastaba of Hetepheres II. apparently was begun about 4713, when she was only about 27 years of age.

The owner of a grave recently found near the Pyramid of Gizeh lived under six kings (SG. 52). The name of the first has been transcribed as Dedefre and of the last Sahure. But counting back from Sahure it is found that the first king of the six must have been Razedf, the Rhatoises of Manetho. (Dedefre belongs to the preceding dynasty.) The owner of the grave might have been born *circa* 4610 and died in 4540.

. . . . .

The Great Pyramid[14] is generally attributed to Cheops and his name is written in the King's Chamber. It is

possible, however, that he merely adapted it from an earlier structure[14] by Sirius.

The Sphinx[16] is near a temple in which granite statues of Khofra were found. It may have been carved in his reign in 4713 B.C.

There is a curious enquiry by Khufu in regard to the 'ipwt' of the 'wnt' of Thoth[17] which may have a chronological significance, and the space in the Testamentary Enactment of Nekonekh[18] is also worthy of attention.

. . . . .

Diodorus who visited Egypt c. 60-56 B.C. stated that Menes and 54 successors reigned more than 1400 years. From the First to the end of the Fifth Dynasty there were 55 kings and they reigned 1415 years according to the evidence.

NOTE 16. THE SPHINX AND THE ZODIAC OF ESNEH.

There is a zodiac* inscribed in the Temple of Esneh. It may be a late copy of an earlier zodiac. It is oblong in form and as is usual in such cases divides the zodiac in two, each half containing 6 signs. One half contains the signs Pisces, Aries, Taurus, Gemini, Cancer, Leo, and the other half Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces. In Egypt oblong zodiacs (with the exception of the Athribis zodiacs of the Roman period) were divided at or near the solstice points, from which we may assume that this zodiac represents a time not far from the period when the end of Leo or beginning of Virgo was rising heliacally on the day of the Summer Solstice. The zodiac also has the peculiarity that before the sign Virgo a Sphinx is inserted, a lion with the head of a woman, surely a symbol of the transition from Virgo to Leo.

This suggests that the colossal Sphinx carved out of rock near the pyramids of Cheops and Kephren belongs to the same period. It is usually attributed to the reign of Kephren (WH. i. 177) and therefore if from internal evidence the date of this zodiac can be fixed we obtain a probable date for Kephren.

Now if the summer solstice was near the transition from the rising of Leo to the rising of Virgo this must represent a date within 1000 years on either side of 4400 B.C. when the solstice fell on 29th July (Julian) 30 days before the Rising of Spica.

* See Plate III.

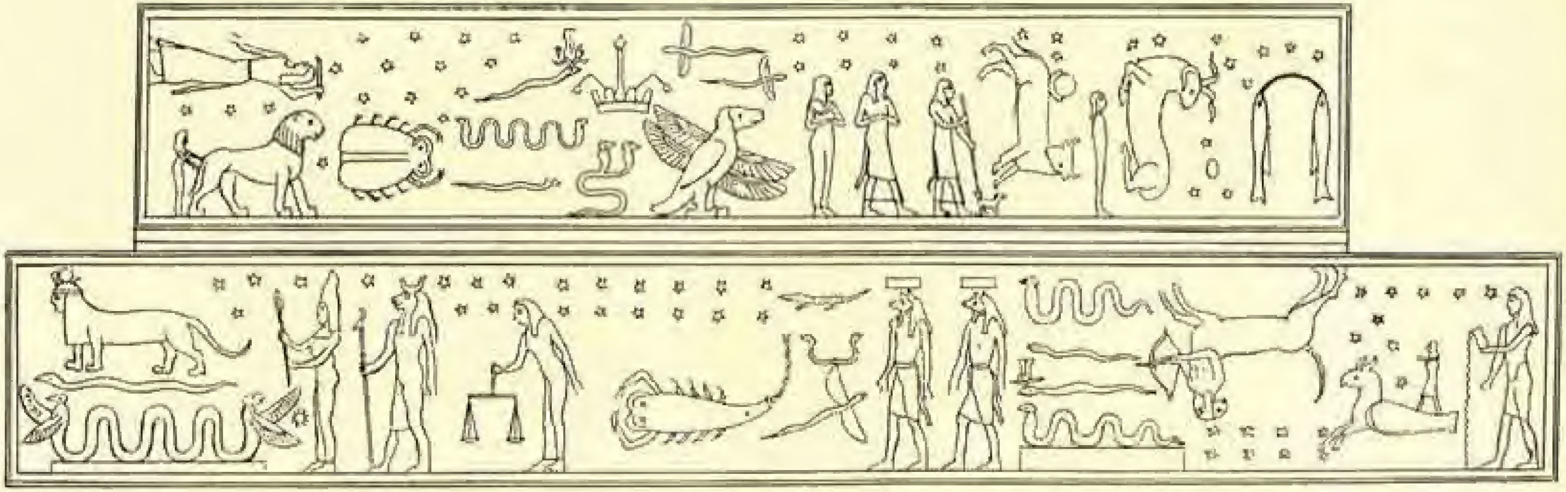

Plate III. THE ZODIAC OF ESNEH.

Reproduced from the "Transactions of the Scottish Lodge of the Theosophical Society," 1893.
(The original source is not there stated.)

See Note 16.

(*facing page* 110)

There is, however, a further clue, the crown above the two-headed serpent. This does not occur in any other zodiac in the position shown here namely in Cancer, so it does not represent a star or constellation, but a configuration of planets. Now Atum wore "the double crown and the two feathers of Ammon, or in place of them the two royal serpents round his headdress" (BU. i. 51) and Osiris was called "the regulator of eternity" (BU. i. 55). This suggests a configuration with Jupiter (=Ammon=Osiris) as the principal planet, in other words the Conjunction of Jupiter and Saturn[5] at which the Feast of Zet (for which the hieroglyph contains a serpent) was celebrated. Another clue is the presence of the crocodile Sebek (sacred to Set, Mars) in Scorpio. It may represent, therefore, the "star of Sebek" namely Mars. On the other hand it is possible that it represents a constellation for it is several times found in this position.

Computation shows that about the day of Rising of Spica (c. 31st August) 4713 B.C. Jupiter and Saturn were in conjunction in the constellation Cancer and Mars was in the constellation Scorpio. The combination occurs on an average once in $20 \times 12 \times 12 = 2880$ years. According to the chronology Khafre reigned from 4726 to 4660.

NOTE 17. THE 'IPWT' OF THE 'WNT' OF THOTH.

The Westcar Papyrus was translated by Professor Erman in 1890. It contains a series of stories supposed to be told about Cheops. Among these is the story of the 'ipwt' of the 'wnt' of Thoth, told by Hortatouf, son of Cheops, commented on by Alan H. Gardiner in 1925 (JEA. XI. 2).

Djedi, a magician, performed wonderful feats before the king. Now Cheops had been looking for someone who knew "the number of the 'ipwt' of the 'wnt' of Thoth, in order to make the like for his own horizon" and thought that as Djedi was so wise he might be of help.

"Then said King Cheops (to Djedi): What of the report, thou knowest the number of the 'ipwt' of the 'wnt' of Thoth. Djedi said: So please thee I know not the number thereof, O Sovereign, my lord, but I know the place where . . . and His Majesty said: Where is that? and Djedi said: There is a box of flint in a room called Revision in Heliopolis: in that box."

Then he goes on to say that it will not be he that will bring the box, but the eldest of the children who are in the womb of Reddjedet. "Thy son his son then one of these." Reddjedet the story records was the wife of a priest of Heliopolis who would give birth to triplets. The Sun-god Ra sent goddesses to bestow a blessing at the birth, the children being named Userkaf, Sahure and Kakau, who were to become kings.

Now Userkheres is the first king known to have called himself son of Ra, and in the list of Eratosthenes he is

called Heliodotus (Gift of the Sun) so that there is little doubt that the story refers to him and Sahure, and possibly a brother Kakau, coregent, whose name does not appear in the lists.

This being clear the meaning of the 'ipwt' of the 'wnt' of Thoth may be conjectured. Thoth as noted elsewhere is Sirius[14] (or the month[1] called after it, or occasionally Mercury the planet of Sirius). Now it so happens that one of the great Jupiter Saturn conjunctions[9] took place in the 31st year of Userkaf (4534) the planets then rising almost exactly on the day of rising of Sirius. The Papyrus, therefore, perhaps gives a corrupt copy of a story in which the question was "Can you tell me when will occur the cyclical return of the Great Conjunction near Sirius?" especially since the other kings mentioned, Zoser, Nebka and Snofru (each the founder of a dynasty) also happen to be kings in whose reign a great conjunction occurred.

It may be that Cheops was hoping that this would occur in his lifetime so that he might record it on his tomb, in the same way that Zerta had an ivory label[10] depicting the date of Rising of Spica in his reign. Djedi, however clever a magician he might be, was not able to hasten the conjunction for Khufu's benefit.

If the story is right that Userkaf would be born in Cheops' reign then my chronology is impossible. But there is clear confirmation of Africanus' correct insertion of at least Khafre, Menkaura, and Shepseskaf between Khufu and Userkaf. That Khafre had a long reign is confirmed by the independent evidence of Herodotus who allotted to him 56 years. It seems difficult from the other evidence to squash Menkaura and Shepseskaf (not to mention the Rhatoises, Bicheris and Thampfthis of Manetho) into a space which would make it possible for Userkaf and Sahure to be born in the reign of Cheops. It seems better

to assume that the Westcar Papyrus is wrong on this point and to rely on the astronomical evidence and Manetho, especially as the *Book of the Dead* calls Hortatouf the son of Menkaura, not of Cheops (AG. XXV. 47-48).

NOTE 18. THE EXTRA SPACE IN THE WILL OF NEKONEKH.

In the tomb of Nekonekh (a steward of the palace whom Userkaf had honoured by making him priest of Hathor (the goddess of Spica) at Tehneh and mortuary priest of Khenuka) is contained his Will in which he makes his children jointly his successors in both offices (BR. I. § 213ff.) Having thirteen children he gave eleven a month each and divided the remaining month between two, each receiving their proportionate share of the priest's income.

In the tables for both offices a vacant space follows the space for the 2nd month of the 3rd Season. Now reference to the chronology shows that Userkaf commenced to reign about 4564 and (counting coregencies) reigned till 4536. The Rising of Spica took place in the 2nd month of the 3rd Season (Re Hor Khouti) from about 4523 to 4406. Thus Nekonekh, who possibly died later than Userkaf, has left a double space for the month in which Spica (the star of Hathor) then rose.

NOTE 19. THE SIXTH DYNASTY.

The Sixth Dynasty apparently overlapped the Fifth. The first year of Pepi I. is fixed astronomically as 4330-29 owing to the fact that the great conjunction of Jupiter and Saturn took place towards the end of his 35th year. Manetho's figures (except for some odd months) and possibly those of the Turin Papyrus if all known are correct for the interval from the end of Rhathures' reign to the beginning of that of Pepi. The whole reigns including coregencies, and the portions of reign excerpted by Manetho and the Turin Papyrus were possibly as follows:

	Whole Reign		*Manetho*		*Turin*	
Menkheres	34	4447-4413	9	4447-4438	8	4447-4439
Tankheres	45	4439-4394	44	4438-4394	28	4439-4410
Onnos	49	4410-4360	33	4393-4360	30	4410-4380
SIXTH DYNASTY.						
Othoes	50	4380-4330	30	4360-4330	*x*	4380-4336
Userkere	6	4336-4330	0		*x*	4336-4330

Othoes may thus have usurped power in his 20th year of reign.

Engraved on the rocks of Hammamat quarry (BR. I. § 295ff.) are inscriptions of Pepi's reign important for chronology. The king is shown in one inscription enthroned in the Jubilee Hall and below are the words "First Occurrence of the Sed Jubilee." Another shows him standing before Min (Jupiter). Behind him are the words "First Occurrence of the Sed Jubilee" and the inscription of the expedition reads "Year after the eighteenth occurrence (of the numbering) third month of the third season (eleventh month) day 27 of the king of Upper and Lower Egypt, Merire (Pepi I.) who lives forever."

Now normally the numberings took place once in two years. Therefore this the year of the eighteenth occurrence

(late in the year, the numbering having already taken place) must be either the 35th or the 36th year according as the first numbering was in the 1st or 2nd year. But Eratosthenes' list[9] shows that the Great Conjunction took place in his 35th year. Computation shows that Spica rose in 4295 B.C. about 31st August, then the 29th of the 11th month, Jupiter rose about 29th August the 27th of the 11th month, and Saturn about 26th August the 24th of the 11th month. This was the Great Festival of the Beginning of the Seasons which did not occur again till the time of Senousrit III., but this is the only occasion when it occurred close to the 28th of the 11th month.

The usual meaning of the Sed Festival is the ceremony at coincidence of the Rising of Spica with the 1st of the lunar month, but it cannot mean this here unless the numberings were more frequent than biennially for by the 35th year there would have been at least one previous Sed Festival. The same peculiarity occurs in the reign of Nebtauira of the Eleventh Dynasty, a Festival transcribed by scholars as the Sed Festival, which (in that case owing to the period of year in which it fell) could not refer to the lunar Spica Festival but only to the ordinary conjunction of Jupiter and Saturn described on the Palermo Stone[5] as the *Zet* Festival. I do not know what hieroglyphs were used in these two instances. If they were the same as are ordinarily used for Sed then the two words *Zet* and Sed must be phonetically more nearly alike than the English spelling would suggest.

The probability that the reference here is to the conjunction is enhanced by the fact that Pepi is shown before Min, namely Jupiter. This was not the first occurrence of the conjunction in the reign, but it was the first of the new great cycle of 900 odd years, the previous one being the last of the old cycle.

But if we suppose that it is the lunar festival and that the year is some other year than the 35th it also supports the chronology though not so precisely, for it follows that Spica must have been rising near the date in question at the time of the lunar festival.

There was an inscription 9 days later at Sinai which also refers to the "First Occurrence of the Sed Jubilee."

In the year of the "25th numbering" (probably the 49th year of reign) there is another reference to the "First Occurrence of the Sed Jubilee." Breasted suggests that this is an "*epitheton ornans*" attached to the name of the king. Since the "First Occurrence" of the conjunction in the 9 century series was of extraordinary importance this theory may quite well be correct.

Weigall suggests with less probability that the "year after the 18th numbering" was the 20th year and "the 25th" in the 26th year according to two different systems of reckoning, the one system starting 6 years before the other.

* * * * *

The great conjunction in the reign of Pepi II. is recorded as taking place in the hundredth year[9] less one hour. In 4176 B.C. 1st Hathor fell on 7th September and the Great Conjunction near Spica took place then, computation yielding the date 8th September for the Rising of Saturn and 12th September for the Rising of Jupiter. (On only one year in about 32,850 years would the planets rise in conjunction near Spica within 5 days of 1st Hathor, assuming hypothetically that the Wandering Calendar lasted as long.) It is quite possible that the computation of date is slightly in error and that the later of the two planets did in fact rise on the morning of 1st Hathor. If that were so their appearance on the horizon would take place 40 minutes or an hour before sunrise. As the regnal years were reckoned from 1st Hathor to 1st Hathor of the

wandering year, it would thus be at the completion of one of Pepi's years less one hour and such a coincidence was well worth recording in detail in the list of Great Conjunctions. (The nearness of computation and recorded date in this case and that of Pepi I. shows that there can have been no great alteration of the Wandering Calendar between this date and that of the Twelfth Dynasty.) Eratosthenes gives it as the hundredth year, therefore Pepi probably lived to be over the hundred, or at least into his hundredth year, if his successor's first year was only reckoned to commence on the New Year's Day following Pepi's death. Pepi must have succeeded to the throne as an infant. On Methousouphis' death when Pepi was 6 years old he became sole king. Nitocris is not to be confused with the Nitocris on the fragment 43 of the Turin Papyrus which probably belongs to the Ninth Dynasty.

Reverting to the reign of Methousouphis (4277-70) a high official of his, Uni, records how he had been sent to Hatnub to bring an offering table of hard stone (BR. I. §323). "I hewed for him a cargo-boat of acacia-wood of 60 cubits in its length and 30 cubits in its breadth built in only 17 days in the third month of the third season (eleventh month). Although there was no water on the . . . (?) . . I landed in safety at the pyramid (called) 'Mermere-shines-and-is-Beautiful.'"

In Methousouphis' reign the eleventh month extended from about 28th July to 26th August (Julian) equivalent to 25th June to 24th July (Gregorian). The water was at its very lowest at the solstice just before the Floods began to rise and in the early part of the inundation season was still very low, so that the chronology is in harmony with this evidence.

The dates of quarrying[39] in this dynasty tally very well with the probable dates derived from the Persian period.

Note 20. SEASONAL DATES.

It is possible to make use of dates of operations and events, which owing to their seasonal nature are limited to a portion of the year, as a partial check on the chronology proposed, if such dates are in terms of the Egyptian Wandering Year. If such dates are found on conversion to the Gregorian calendar to fall at the correct season the chronology proposed for the period concerned is not impossible.

The chief operations and events which have been utilised in this connection are Work in the Mines, Nile levels, Military expeditions to Syria, the Flax Harvest, Rainfall.

Work in the Mines.

Quite a large number of dates of quarrying are preserved from the time of Snofru I. onwards. In order that these may be of use for our purpose it is necessary to know at what season of the year quarrying is possible or most probable. Weill regards the summer as unsuitable for quarrying and regards 11th January to 23rd March as the ideal period. Petrie regards the period of low water as the most unsuitable period as the stones could not be transported down the Nile. As these opinions are conflicting it is necessary to examine dates of quarrying at a period when the chronology is accurately known and agreed upon. Fortunately a number of such dates are available from the Persian period. They are as follows:

King's Regnal Year	*Place*	*Egyptian Date*	*Julian Date*	B.C.	*Gregorian Date*
Darius 26	Hamamat	10th month	21st Sept. to 20th Oct.	495	16th Sept. to 16th Oct.
,, 26	,,	12th month	20th Nov. to 19th Dec.	495	15th Nov. to 14th Dec.
,, 27	,,	3rd month	23rd Feb. to 24th Mar.	494	18th Feb. to 19th Mar.
,, 27	,,	13th of 8th month	4th Aug.	494	30th July
,, 28	,,	11th of 9th month	31st Aug.	493	26th Aug.
,, 30	,,	8th month	22nd July to 20th Aug.	491	17th July to 15th Aug.
,, 30	,,	15th of 8th month	5th Aug.	491	31st July
Xerxes 2	,,	19th of 1st month	9th Jan.	484	5th Jan.

The actual number of dates is not sufficient to warrant any certain conclusion, but the evidence such as it is favours the view that July, August, September, October are likely periods for quarrying and that May and June are unlikely periods, for five examples fall between July and October, three between November and March, and none in April, May, or June. In other words it favours Petrie's view and is diametrically opposed to Weill's view. No doubt it would be very unpleasant to work in the heat of summer and those who were employed on the work would curse and regard the Season as unsuitable, but it is clear that suitability on other grounds, sometimes at least, weighed more strongly with those who ordered the quarrying.

We may now proceed to examine earlier dates and see at what seasons they fall on the chronology and Calendar Theory which I have proposed. The dates from the Old Kingdom are as follows:

Dynasty	King's Regnal Year		Place	Egyptian Date	Julian Date	B.C.	Gregorian Date
Fourth	Snofru I.	17	—	22nd of 6th month to 8th of 11th month	17th Aug. to 31st Dec.	4867	10th July to 23rd Nov.
Sixth	Ati	1	Hamamat	2nd of 4th month	15th Jan.	4336	12th Dec.
,,	Pepi I.	35	,,	27th of 11th month	29th Aug.	4295	26th July
,,	,,	35	Maghara	6th of 12th month	7th Sept.	4295	4th Aug.
,,	,, (25th numbering)	49	Hatnoub	1st of 1st month	3rd Oct.	4281	30th Aug.
,,	Merenra (Methusfis)	—	Hesse	28th of 10th month	c.25th July	4277	c.22nd June
,,	,,	—	—	11th month	c.28th July to 26th Aug.	4277	c.25th June to 24th July
,,	,,	—	Hamamat	2nd of 11th month	c.29th July	4276	c.26th June
,,	,,	—	Hamamat	3rd of 12th month	c.29th Aug.	4276	c.27th July

It will be seen that all these dates fall within the range deduced as probable and possible from the Persian period with the exception of three of the dates of Merenra in June which are just a trifle earlier than one would expect. However an inscription of Uni definitely records[19] that the water was low in the eleventh month when he hastened to bring an offering table in time for some special festival.

On, Weill's Chronology Snofru's quarrying included the period when the Nile was at its very lowest—May and early June.

We may now examine dates from the Middle Kingdom.

Dynasty	King's	Regnal Year	Place	Egyptian Date	Julian Date	B.C.	Gregorian Date
Eleventh	Nibtaouire	2	Hamamat	3rd of 2nd month	4th April	3422	7th March
,,	,,	2	,,	23rd of 2nd month	24th April	3422	27th March
,,	Sankhkare	8	,,	3rd of 9th month	c.24th October	3394	c.27th September
,,	Amenmehat I.	—	,,	3rd of 12th month	c.20th January	3393-73	c.25th December
,,	,,	—	,,	11th month	c.Dec.-Jan.	3393-73	c.Nov.-Dec.
Twelfth	Senousrit I.	16	,,	3rd month	14th April to 13th May	3358	19th March to 17th April
,,	,,	38	,,	4th to 20th of 4th month	13th to 29th May	3336	16th April to 2nd May
,,	Senousrit II.	2	,,	8th of 4th month	8th May	3298	12th April
,,	Senousrit III.	14	,,	16th of 4th month	8th May	3267	12th April
,,	Amenemhat III.	2	,,	1st of 3rd month	17th March	3240	19th February
,,	,,	3	,,	3rd of 3rd month	19th March	3239	21st February
,,	,,	6	Sarbout	7th to 9th month	14th July to 12th October	3236	18th June to 16th September
,,	,,	19	Hamamat	15th of 5th month	26th May	3223	30th April
,,	,,	20	,,	12th of 3rd month	24th March	3222	26th February
,,	Amenemhat IV.	9	Sarbout	26th of 7th month	26th July	3186	30th June

It will be noted that the majority of these dates fall late in the quarrying season. It may have been the practice at that period to record the date when work ceased for the year. None of the dates fall between 17th April and 30th June except in the 38th year of Senousrit I. when work was continued as late as 2nd May, the 19th year of Amenemhat III. when it went on to 30th April, and possibly the 6th of Amenemhat III. when it began on some date between 18th June and 17th July. (The day of the month is not mentioned.) The inscription[25] of Horure confirms that it was very hot on that occasion.

That Nebtouire's date is correct is confirmed by a Jupiter-Saturn conjunction, and also that a gazelle gave birth.[24]

On Weill's chronology the quarrying in Amenemhat III.'s 6th year began in May, and the date in Amenemhat IV.'s 9th year was 23rd May (WC. 69).

Finally, we may consider dates of quarrying in the time of the New Kingdom.

Dynasty	*King's Regnal*	*Year*	*Place*	*Egyptian Date*	*Julian Date*	B.C.	*Gregorian Date*
Eighteenth	Amenhotep III.	36	Sarbout	19th of 6th month	c. 20th March	1502	c. 7th Mar.
Nineteenth	Ramses II.	3	Hamamat	27th of 10th month	4th July	1391	22nd June
Twentieth	Ramses IV.	2	,,	12th of 2nd month	30th July	1198	19th July
,,	,,	3	Sarbout	11th month	14th Apr. to 13th May	1197	3rd Apr. to 2nd May
,,	,,	5	,,	10th month	15th Mar. to 13th Apr.	1195	4th Mar. to 2nd Apr.

The earliest date is 22nd June and the latest at the end of the quarrying season some date between 3rd April and 2nd May. Thus of all the thirty-seven examples from the Old Kingdom to the end of the Persian period, none fall between 2nd May and 18th June, the period when the Nile is at its very lowest.

Nile Levels.

The height of the Nile has a seasonal variation, being highest in September-October and lowest in May-June. The actual dates of highest and lowest Nile are not precisely the same in each year but vary within well-recognised limits. Accordingly if dates are available in terms of the Wandering Calendar these may approximately confirm (or refute) the chronology.

There is a record attributed to the Fifth (Africanus' Fourth and Fifth) Dynasty showing the height of the Nile in a tank in Shom 22 cubits, Pero 23 cubits, Akhe 25 cubits (WH. i. 39). If this refers to the height on the first day of each season it tallies with a date of about 4500 B.C. when the 1st of Shom was equivalent to 20th June (Gregorian), the 1st of Pero to 20th February (Gregorian), and the 1st of Akhe to 23rd October (Gregorian).

Another date checked approximately by the Nile level is the third year of Shabataka for there is an inscription of 5th Pachon referring to High Nile about that time (WC. 84). Borchardt showed that at Cairo the date of High Nile is usually between 18th September and 7th October (Gregorian) though it might be as early as 25th August or as late as 27th October. This yields a probability that the date was between 706 and 630 B.C. (when 5th Pachons fell between 18th September and 7th October Gregorian), and a possibility that it was as early as 786 (when 5th Pachon corresponded with 27th October) or as late as 530 B.C. (when 5th Pachon corresponded with 25th August Gregorian). As the date of High Nile would on the average be earlier further up stream these dates are merely rough approximations.

There is also evidence[5] on the Palermo Stone which may relate to the date of High Nile, and a graffito from

about the time of the Eighteenth Dynasty[20] giving the date of commencement of the rise of the Nile.

An exceptional flooding of the Nile[22] in the Twenty-Second Dynasty affords evidence of value in regard to the calendar.

Expeditions to Syria.

There is a remarkable uniformity in the period of the year when expeditions to Syria were commenced in the Eighteenth and Nineteenth Dynasties. This implies that the dates were chosen because they were at the most suitable season for commencing operations. Now obviously the best time to go would be after the harvest was reaped (or towards the end of the harvest season when a portion at least was reaped) and the barns full, and the most foolish time to go would be when the storehouses were nearly empty and the crops were not yet ripe for there would not then be a sufficient supply of food for the invading army.

The following are the dates of commencement :

Year	*King's Year*		*Date*	*Julian*	*Gregorian*	*Reference*
1593 B.C.	Thothmes III.	23	4th of 9th month	26th June	12th June	BR II. §417
1585	"	31	3rd of 9th month	23rd June	9th June	BR II. §469
1569	Amenhotep II.	1	26th of 9th month	12th July	28th June	BR II. §780
1389	Ramses II.	5	9th of 11th month	15th July	3rd July	BR III. §298

In the campaign of Thothmes III.'s 23rd year he went up to Megiddo and would be disappointed to find that the harvest was not yet reaped, since he had been accustomed to find it all gathered in the low-lying plains by the beginning of June. The harvest at Megiddo is mentioned as follows: (BR. II. § 437) "Behold the cultivable land was divided into fields which the inspectors of the royal house L. P. H. calculated in order to reap their harvest. Statement of the harvest which was brought

to His Majesty from the fields of Megiddo: 208,200 + x fourfold heket of grain besides that which was cut as forage by the army of His Majesty."

In *Hasting's Dictionary* (1898) in the article on Agriculture it is stated: "The commencement of Harvest naturally varied not only with the season but according to elevation, exposure, etc. On the average it began with barley in the neighbourhood of Jericho about the middle of April, in the coast plains ten days later and in the high-lying districts as much as a month later. Wheat was a fortnight later in ripening and the barley and wheat harvest lasted about 7 weeks." Now Megiddo was high up on the plain of Esdraelon (about 200 feet above sea level) and was to the south-west of the plain near where it really ceases to be a plain but slopes up to the hill which is part of the range ending in Mt. Carmel. The fields were thus on a slope facing north-east and would get little sun. The mean date of commencement of barley harvest would therefore be later than 15th May, and of wheat harvest later than 1st June, and the end of the harvest season would normally be later than 3rd July.

This tallies with the chronology for the Battle of Megiddo was fought on the 21st of the 9th month (29th June, Gregorian) just when the majority of the fields would be ready for cutting, especially since with the approach of the enemy harvesting operations had probably been suspended. On Weill's Chronology the date of the Battle of Megiddo is 2nd May (Gregorian) (WC. 77), probably before even the earliest crops in that district were ready.

According to the Sirius theory and later date for Eighteenth Dynasty the campaign of Thothmes III.'s 31st year commenced on 12th April (Gregorian), 1470, Amenhotep II.'s campaign on 29th April (Gregorian), 1446, and Ramses II.'s campaign on 4th May (Gregorian), 1287.

Another interesting Seasonal date is the reference on the Tomb of Thutnakht to the flax harvest. The date given for the harvest is 23rd of the 4th month of the 1st season. According to Weill (WC. 81) the season of the flax harvest in the province of Minieh is early April (Gregorian). According to Petrie (AE. 1929. 40) the flax harvest is placed in the Coptic Calendar on 19th March (Gregorian). Wilkinson states that flax was sown in mid-November and plucked 110 days later.

All that is known with certainty in regard to the period of Thutnakht is that he was a nomarch of the time of the Twelfth Dynasty. His father was called Nehera and his mother Satuzhetep, while his wife was Hathorhetep born of Tehutihetep (GB. II. 3). His tomb was one of 10 tombs discovered at El Berseh, of which only 1, that of the nomarch Amenemhat, contains any royal names. Amenemhat's tomb has the names of the kings from Amenemhat II. to Senousrit III., and there is a record apparently of his officiating at a Sed Festival in the 31st year of Senousrit I. (Graffito X. GB. II. 53). He was the son of a Nehera and Satuzhetep and it has been supposed therefore that Thutnakht was his brother. This may very well be so but the name Thutnakht was very common in the family as Griffith's hypothetical genealogical tree shows. The names Nehera and Satuzhetep were also common. Thus Griffith places both a Nehere and Satuzhetep in the reign of Senousrit III. and the names Hathorhetep and Tehutihetep occur in the generation immediately preceding that. Breasted apparently takes the view that Tahutinekht, son of Nehera and Satuzhetep, belongs rather to about this period.

If we suppose that Tahutinekht was a brother of

Apophis of the Fifteenth Dynasty, possibly Aseth. The date on my Chronology[33] corresponds to 16th-17th February (Julian) 2034 B.C., equivalent to 30th-31st January (Gregorian). This is within the period of the year—November to April (RE. 66)—when rain is possible, appearing within that period at Cairo on about 15 days and nights, chiefly in January and February (RE. 73) and more rarely further inland. A thunderstorm is recorded by Rhind on 16th February, 1856, at Keneh (RE. 140) and by Wilkinson on 11th January, 1822, at Cairo (RE. 146).

On Meyer's Chronology the date falls in the Seventeenth Century, but on his Sothiac theory the first few days of the Wandering Calendar then fell in September, when rain is unknown.

. . . .

Other dates of Seasonal interest are the approximate dates of the solstices in the reign of Amenophis III., as shown by the Karnak Clock,[48] and the date of blooming of Acacias[51] in the reign of Paynozem I.

Note 21. THE SEVENTH AND EIGHTH DYNASTIES.

Manetho states that the Seventh Dynasty lasted only 70 or 75 days. At the top of fragment 48 of the Turin Papyrus there is a summary of a dynasty lasting "75 years." The Armenian version of Manetho also gives 75 years and this is possibly correct. It has the effect, however, of giving the Tenth Dynasty an excess of more than 75 years of domination and this may have led Africanus and Eusebius to suppose that the period here was only days, thus making the interval from the Seventh to Twelfth Dynasties tally with their totals.

Fragment 48 of the Papyrus is all that has been deciphered which appears to pertain to the Eighth Dynasty. Neither the Abydos nor Sakkara Lists give the names of the kings and we will require to await further discoveries or piecing together of other Turin fragments to fill in the gap.

The Acheseus Ocharus of Eratosthenes[9] (perhaps the Uazkara of the monuments) probably belongs to this dynasty.

Note 22. THE NINTH DYNASTY.

For the Ninth Dynasty we have to rely on scattered information and the placing of fragments is a little doubtful. The rulers mentioned[9] by Eratosthenes, however, and dated by the conjunctions of Jupiter and Saturn probably began their reigns about the dates stated in my chronology. (There is a discrepancy of one year between the first year of Neitaqert deduced from the conjunctions and the first year of the dynasty deduced from Manetho's figures.)

As regards Meryabra, Uahkara, and Merykara, most Egyptologists are agreed that one king came between Meryabra and Merykara and that most probably Uahkara was the king in question. He (WH. i. 264) stated that he had waged a disastrous war against the South "a generation earlier," so that he must have had a long reign. It was apparently towards the middle of his reign that the Eleventh Dynasty came into being in the South (some date between 3558 and 3549) started by the Horus Uahankh-Intef who avenged the insults which his people had suffered at the hands of Uahkara in the time of his father, Prince Antef, who described himself (BE. i. 225) as "The hereditary noble, ruler of the Thebaid, satisfying the desire of the king, keeper of the gate of the frontier, pillar of the South, the administrator, making his two lands to live, chief of the prophets."

There may have been another Uahkara about 3850 for Diodorus calls the first king of the Sixth Dynasty Busiris (Userkere?) and notes that 16 generations later a descendant of his, Achoreus, was on the throne. This date implies an average generation of slightly over 30 years.

NOTE 23. THE TENTH DYNASTY.

The two kings Dedkere Shema and Neferkere Tereru are dated by means of the conjunctions[9] of Jupiter and Saturn, and the lengths of reign of the last 4 kings are given on the Turin Papyrus. It, however, gives the length of the dynasty as 181 years compared with Manetho's 185. The kings' names are given in the Abydos List except Sneferenkhre Pepi which name is known from a Scarab. He is probably the Pepi[28] of the Karnak List.

The Eleventh Dynasty was ruling in the South while the Tenth was in the North, but after about 3432 Nebhepura of the Eleventh Dynasty apparently became supreme, so that the Herakleopolitans were only dominant for about 100 years and thereafter vassals first of the Eleventh and then of the Twelfth Dynasty. Abydos must have been part of their kingdom as their names are given fully in the Abydos list.

A king called Neferkehor Neterben (WH. i. 260) made a decree on the 20th day of the 6th month in his first year. This may be the king who succeeded Dedkere Shema, for that date in 3491 fell near the Rising of Spica, possibly a favourite occasion for making official pronouncements. In another decree he fixed the limits of the South as between Zebo (Elephantine) and the 7th Province of Upper Egypt (just South of Thinis). The Tenth Dynasty must therefore have been dominant at one period of his reign though Nebheptre at another period apparently claimed superiority.

The founder of the Tenth Dynasty, Menkere, may be the Moeris of Diodorus, who states that he was 12 generations after Achoreus who on Diodorus' reckoning began to

reign about 3850. From 3850 to 3533 is 317 years which would require an average generation of about 26 years at this point to tally with Diodorus. From Moeris to Sesostris I. he reckoned 7 generations. From 3533 to 3373 is 160 years which would require an average generation over this period of about 23 years.

NOTE 24. THE ELEVENTH DYNASTY.

The end of the Eleventh Dynasty is fixed as 3389 owing to the fact that the lengths of reigns of kings of the Twelfth Dynasty prior to Senousrit III. (who is fixed astronomically) are known and that Amenemnes probably had a sole reign of 16 years, his first four years being contemporary with the last four years of the Eleventh Dynasty.

The Turin Papyrus states the total length of the dynasty as $160+x$ years and accordingly it must have commenced on some date between 3558 and 3549. This is quite in keeping with the fact that in the 33rd year of Sesostris I. (Br. i. § 529) Intefyoker states that his great-grandfather was a scribe in the reign of Uahankh-Intef. The 33rd year of Senousrit I. was 3341-40 and if Intefyoker was 70 then and his great-grandfather 30 in 3510 B.C., this implies an average generation of 43 years, distinctly longer than the normal average no doubt but quite of reasonable length. Breasted has shown that the reigns of individual kings were as shown with seven periods of uncertainty denoted by x.

The date of Nebtouire is however determinable from the fact that cut on the rock walls of the Wadi Hammamat (BR. i. § 434ff.) is a relief showing the king offering wine before Min (Jupiter). Behind him are the words " First Occurrence of the Sed Jubilee," and above the date " Year 2. Second month of the first season day 3." Now in the Sothiac cycle 3rd Kaherka corresponded with 4th April in 3422 B.C. and years in the same tetraeteris. This is not therefore the Sed Festival at the coincidence of New Moon

with the Rising of Spica which then took place about 6th September but probably the Heb Sed (or Zet) Festival occurring at the Rising of Jupiter (Min) in conjunction with Saturn. Calculation confirms this hypothesis for it yields 5th April, 3422, as an approximate date of Rising of Jupiter, with Saturn close to conjunction. As there is a margin of error of more than one day in the computation, Jupiter may well have risen exactly on 3rd Kaherka. At the time of the festival Amenemhat relates how a gazelle came straight to the very block which the quarrymen were cutting and dropped her young upon it, thus confirming 4th April (=7th March Gregorian) as falling at the correct season of the year. On Weill's chronology the event occurred in the beginning of February (Gregorian)! On an average Jupiter would rise on 3rd Kaherka in conjunction with Saturn once in 20 × 365 = 7300 years so there is a high probability that April 3422 fell in the 2nd year of Nebtouire, and that his first year was reckoned from 1st Hathor (=4th March) 3423 B.C. Therefore the combined total of the unknown years in Nebtouire's and Senkhkere's reigns is 24 years.

We further know that Senkhkere celebrated a Sed Festival for there are "pieces of a cenotaph sarcophagus with the king's name and of a sedheb seated figure in close robe." (PE. i. 146.)

Between the conjunction of 3422 B.C. and the commencement of Amenemnes' reign there was only one conjunction that of 3403-2 which must therefore have fallen in Senkhkere's reign.

In the period from about 3554 to 3423 known periods amount to 110 years leaving 21 years to be distributed between the 5 unknown periods. The distribution is necessarily entirely hypothetical but I have allotted to Nebheptre 16 of these years as he could not have accomplished in a much shorter reign as much as he

appears to have done. (The order of the kings is also doubtful; cf. Meyer in AG. XXIV. Pt. 2. 236.)

. . . . .

This dynasty came into being because of offence given by officials of Uahkara of the Ninth Dynasty and Uahankh at some stage asserted his right to rule all Egypt. But there was evidently a see-saw struggle and it is doubtful if the Herakleopolitans paid tribute at any time to the South before the time of Nebhepura for only the last 43 years are recognised by Manetho as a period of dominance. Thinis appears, however, to have been definitely tributary till the reign of Senkhibtoui for on a stele (BE. i. 249) of an official of his called Antef is mentioned "the 14th year after the year of the revolt of Thinis." This revolt may therefore have taken place about 3487 B.C. and this may be the same occasion on which Neferkehor of Heracleopolis (who possibly sent troops to aid the Thinites) fixed the limits of the South.

Nebheptre described himself (BE. i. 250) as "binding the chiefs of the Two Lands capturing the South and North land, the highlands and the two regions, the Nine Bows and the two Lands." How far this is fact and how far idle boasting it is impossible to say. Whatever the extent of his conquest it was not a permanent conquest of the North for his successer Nebhepura took the title of "uniter of the two lands" and Manetho's reckoning of 43 years dominance yields the date 3432 B.C. which falls in Nebhepura's reign. He was "revered to a late date in Egyptian history as one of the great kingdom builders." (BE. i. 257.)

The Karnak List, after mentioning early Antefs, names Teta (Dedkhere), Pepi and Merenre (Merenhor) of the Tenth Dynasty who must therefore have been dominant before Nebheptre's conquest.

The Abydos List mentions only Nebchrure (presumably Nebhepura) and Sankhkere of this dynasty. Nebtouire's

reign was probably therefore not very important and during the whole of it he may have been coregent with one or other of these two kings. Nebtouire's prime minister, Amenemhat (possibly the father of the founder of the Twelfth Dynasty) seems to have been the strong man of the time.

A wise man living in the reign of King Snofru (possibly Sneferka I. of the Tenth Dynasty reigning in the North 3432-3414) prophesied, perhaps knowing the greatness of Amenemhat and seeing in his young son a chip of the old block, "There will be a king who will come from the South whose name shall be Amemy, the son of a woman of Nubia, or a child of Upper Egypt . . . he shall unite the Two Powerful Ones. The people of his time shall rejoice. . ." (WH. i. 316.) The writer goes on to bewail the land's present misfortunes, "The land is diminished but its rulers are multiplied." Though Nebhepura claimed to be uniter of the two lands he and his successors were evidently not very successful in enforcing authority.

After Amenemnes' reign Manetho states the total from Menes as 96 kings reigning 2300 years (70 days). There were 210 kings, of whom 10 of the Tenth and 4 of the Eleventh have to be discounted since they were not dominant but subsidiary to the ruling king, leaving a total of 196 kings who ruled from 5776 to 3373, 2403 years.

NOTE 25. THE TWELFTH DYNASTY.

The date of the first part of the reign of Senousrit III. is fixed by the fact that the Kahoun Papyrus[38] (WC. 13) shows that the Rising of the Sothis (Spica), took place in his 7th year on the 16th of the 4th month of Perit, the 8th month of the year (which was Khent Khat according to the seasonal grouping then in use). The calculation[1] of the movement of the Sothiac calendar relatively to Spica yields an approximate date 3274 B.C.

The date assigned to him receives remarkable confirmation from Eratosthenes' list[3] of great conjunctions of Jupiter and Saturn in which one of them is listed as occurring in the 18th year of Semphrutraces, *qui et Hercules Apocrates* (*i.e.*, Senousrit III.). Now from the above data it is seen that his 18th year commenced about January 3263 B.C. In that year Spica rose heliacally about 7th-9th September (Julian) and calculation shows that the conjunction of Jupiter and Saturn was then almost exact, closer indeed than it was two great cycles later at the Rising of Spica in Akhenaten's reign, for Jupiter rose heliacally about 6th September and Saturn about 9th September in 3263 B.C. This date in his 18th year was thus the "greatest" conjunction in the 900 year cycle, and even more important than such "greatest" conjunctions usually were. In 3263 the 9th September corresponded to the 21st of the 8th month (Khent Khat) of the Wandering Calendar and this is strikingly in accord with the statement of Thothmes III. (BR. II. § 171) that on the 21st of the 8th month Senousrit III. instituted the Festival of the "Beginning of the Seasons" (? cycles).

(The chance of the rising in conjunction with Jupiter and Saturn occurring in the 18th year of Senousrit III., as already fixed from independent evidence, on the 21st of the 8th month is about 1 in 365 × 900 = 1 in 328,500. The probability that this is not chance coincidence, but is, in fact, the Festival referred to is therefore ·99999+. As, however, an alteration of the calendar[32] by five days in accordance with Weigall's explanation of the Rhind Mathematical Papyrus in the Hyksos period is involved, opponents of my theories may be justified in multiplying the chance by 5 thus stating it at 1 in 65,700 which yields a probability of ·99998+, still sufficiently high I think to be regarded as approaching certainty.)

If Senousrit III.'s first year is fixed the placing of the earlier kings of the Twelfth Dynasty can be determined from monumental records (PE. i. 151). Thus in a statement of accounts the 19th year of Senousrit II. is immediately followed by the first of Senousrit III. Therefore Senousrit II.'s first year would be 3299-8. The 3rd year of Senousrit II. was the 35th of Amenemhat II. Therefore Amenemhat II. began to reign in 3331-30. The 2nd year of Amenemhat II. is known to have been the 44th of Senousrit I., whose first year was therefore 3373-2. There is a double date of the 30th year of Amenemhat I. equivalent to the 10th of Senousrit I., and Amenemhat I. therefore began to reign in 3393. As Manetho gives him only 16 years it is possible that during his first 4 years he was coregent with his predecessor.

Africanus and Eusebius have got Manetho's figures for the dynasty rather mixed up, assigning the 38 and 48 years of Senousrit III. and Amenemhat III. to Amenemhat II. and Senousrit IV. Eusebius' figures, however, bring out a total of 182 years, which as it happens is almost exactly

the interval from the end of the reign of Amenemnes I. to the end of the dynasty.

The Turin Papyrus states the total as 213 years 1 month 17 days, which is apparently correct from the beginning of Amenemnes' reign.

Weigall is quite possibly right in stating that the odd months mentioned in the Turin Papyrus at the end of each king's reign are the months into (or more probably the dates in) the next calendar year, the regnal years being reckoned from the 1st day of the 1st month. If the dynasty ended on the 24th of the 11th month (or 24th of the 10th month) and lasted 213 years 1 month 17 days it follows that Amenemnes' accession must have been on the 7th of the 10th month (or 7th of the 9th month). In 3393 B.C. the 7th of the 10th month was equivalent to 26th November (Julian) equivalent to 30th October (Gregorian) (and 7th of 9th month equivalent to 30th September, Gregorian) when the Nile was not far from its highest level for the year, thus explaining (in a manner different from that proposed by Weigall) Amenemnes' phrase "the Nile greeted me" in his address to his son.

There are 10 dates of quarrying[20] in the Twelfth Dynasty. Only two of these, that in the 19th year of Amenemhat III. and 38th of Senousrit I., fall within the most unsuitable quarrying period.

It was not apparently the habit to send expeditions to the mines or quarries in the hot season so much in the Twelfth Dynasty as at other periods and so an official Treasurer Horure, sent in the 6th year of a king (presumed to be Amenemhat III.) in the 7th month, which then commenced on 18th June, describes the time of year as most unsuitable for quarrying "for the desert is hot in summer and the rocks brand the skin." The work was finished in the 9th month (18th August-16th September) and he

commanded offerings to be made to the Lady of Heaven, Hathor (the goddess of Spica, which then rose about 8th September).

On the tomb of a prince Thutnakht of El Berseh, who was a nomarch in the time of the Twelfth Dynasty, there is a reference to the reaping of the flax harvest[30] on the 23rd of the 4th month of the 1st season. This yields an approximate check on the chronology.

In a graffito there is a reference to a nomarch Amenemhat who celebrated a Heb Sed in the 31st year of Senousrit I. (GB. II. 53). The Heb Sed was held at the ordinary conjunctions of Jupiter and Saturn. Calculation shows that in Senousrit's 31st year 3343-3342 Jupiter rose on 9th December (Julian) and Saturn on 12th December (Julian) thus tallying with the other evidence. It so happens, however, that it was also a year of the lunar Sed Festival, for the astronomical New Moon was on 6th September 3343 B.C. and the moon would become visible one or two days later close to the date of Rising of Spica. As the date in the calendar year is not given and the terms Zet and Sed were indistinguishable at that period it is impossible to say which of the two was intended.

. . . . .

Of considerable chronological interest is the beautiful work of the goldsmith discovered in the tombs of the princesses at Dahshur and Lahun, regarded as belonging to the time of Amenemhat II. (*c.* 3331-3290) or shortly after. Dr. Baikie remarks (BE. i. 379) : " No one can fail to be struck with the extraordinary similarity in style, allowing for the more dilapidated condition of the Mesopotamian jewellery, between the Twelfth Dynasty diadems of the Egyptian princesses and the jewellery of Queen Shub-ad of Ur. Mr. Woolley's description of the two head-dresses of the Mesopotamian queen reads almost

like that of the floral diadem of the princess Khnumit; while the Sumerian head-dress was of a size which meant that it could only have been worn over a wig precisely as in the case of the Lahun crown."

The grave of Queen Shub-ad belongs to a period earlier than the temple of al Ubaid, and the date of the temple is fixed (WS. 41) by " the discovery in the ruins of a limestone tablet inscribed in well-developed cuneiform with the dedication of the building by 'A-anni-padda king of Ur son of Mes-anni-padda king of Ur,' and of a gold bead also inscribed with the king's name and title." Mes-anni-padda reigned according to my chronology (MB. 98) in 3006-3005 B.C. and the grave of Queen Shub-ad is therefore to be attributed to some unknown date between 3189 B.C. (the Flood) and 3006. The earlier part of that period is thus not far from the time of Amenemhat II., and for all we know Twelfth Dynasty styles may have persisted into the Thirteenth Dynasty. In Weigall's chronology Amenemhat II. commenced to reign in 2045 B.C., 1000 years from the time of Queen Shub-ad's grave. Other " short " Egyptian chronologies show a similar discrepancy.

A further important piece of evidence bearing on the chronology is the existence of two alabaster vases (now in the Louvre) inscribed with the names of Manishtusu and Naram Sin, which are similar in shape to Egyptian vases of the Tenth to Twelfth Dynasties (WH. ii. 27) (and possibly of the Thirteenth if examples of that Dynasty were known). There are numerous examples from Egypt but only the two examples from Babylonia. One must, therefore, assume in the absence of evidence to the contrary that the art of making these vases was indigenous in Egypt and that the specimens in Babylonia were either copied from Egyptian models or were imported from Egypt. It follows, therefore, that the art must have been in existence

before the time of Manishtusu (2830-2814) and Naram Sin (2814-2777). On my chronology the Tenth to Twelfth Dynasties cover the period from 3533 to 3180. On Weigall's chronology they cover the period 2271 to 1898, and he explains this by saying that "the shapes of these vases may have been prevalent in Babylonia centuries before they were introduced into Egypt." It is strange in that case that only the two specimens have been found, thus pointing to a probability in the other direction. Weigall apparently feels this argument weak for he mentions another first, "it may be said that the appearance of these kings' names on the vases does not necessarily indicate that they were inscribed at that time: they may have been offerings to the spirits of those monarchs made hundreds of years after their deaths." No doubt this is not impossible. It can hardly be considered probable.

NOTE 26. THE KAHOUN PAPYRI AND EGYPTIAN LUNAR MONTHS.

Brugsch has tabulated carefully the Festivals of each day of the Egyptian lunar months. There was a festival of the moon on the 1st day of the month and on the 18th day. This shows that the month started with the full moon, for the interval from the full moon to the visible new moon is about 17 days, whereas from the visible new moon to full moon is only about 12 days. That this is so is borne out by inscriptions such as the following (BT. 34), "the gods who glorify the eye of the moon when he renews his course on the 15th of the lunar month," referring, I assume, to the astronomical new moon on the 15th when the Moon invisible is supposed to get fresh life from the Sun. Brugsch, however, and Mahler following him translate the Feast of the first of the month as the Feast of the New Moon. It is only new in the sense that a new month began. Yet Mahler insists that it is the new moon (AG. XXIV. 4-6) and to support his contention translates the Feast of the Fifteenth Day as the Feast of the Full Moon. Brugsch's translation, however, for that day is "Feast of the Fifteenth Day," or "Feast of the god Armaui" (BT. 50). It is strange that Mahler should take this view since he himself realises that the Egyptians used the word "tep" to mean the beginning of the month, and that they applied it to the full moon not the new moon (AG. XXIV. 9-10).

One of the reasons given by Brugsch for considering the first of the month as referring to what we now call the New Moon is the shape of the hieroglyph used for the

Festival of the first of the month which is that of a crescent (in a circle) (BM. 58) but even in modern times the crescent is used astronomically to signify the moon without reference to its phase, and in any case if the hieroglyph is to be assumed to denote the phase it could not be held to represent the astronomical new moon, for the moon is then invisible. It need, therefore, signify no more than the first of the lunar month.

Brugsch makes much of the fact that the first of the lunar month was the day on which the god Khonsu was conceived and the second that on which he was born, but in reality this is evidence against his theory for Khonsu was the god of Aries, the opposite portion of the zodiac from Hathor: and in the month of the New Year Festivals, Hathor, the full moon was in Aries, the sign of Khonsu.

Originally, therefore, it would seem that the lunar months began at full moon, though in the Eighteenth Dynasty (when there was much contact with the Babylonians) and later the lunar month like that of the Babylonians may have begun at the New Moon. The old Festival names were retained but had lost their original significance.

. . . . .

The lunar months are of special interest in connection with the Kahoun papyri. In 1899 Borchardt discovered in fragments of papyrus at Kahoun a copy of a letter that the prince and director of the temple Neb-kau-ra addressed to a priest Pepyhetep in the 7th year of Senousrit III. "You ought to know that the Rising of Sothis takes place on the 16th of the 8th month. Announce it to the priests of the town Sekhem-Usertesen and of Anubis on the mountain and of Suchos . . . and have this letter filed in the temple record." (AG. XXIV. 116.)

Near it was another fragment which records on 17th of the 8th month presents given on the occasion of the

Rising of the Sothis. It is also dated in the 7th year of Senousrit III. and forms part of a series of records of temple revenues (compiled each lunar month since they are at intervals of 29 or 30 days). Most probably they were compiled on the first of the lunar month. Now by means of the Sothic cycle from the date of Rising of the Sothis on the 16th (the record of offerings being for the following day) the approximate date of Senousrit is ascertained. It received a check[28] from the Festival of the Beginning of the Seasons in his 18th year (3263 B.C.) enabling us to fix the Rising of the Sothis in the 7th year as in 3274 B.C. Calculation shows that the Sothis rose about 7th or 8th September and calculation of the full moon shows that it occurred on 8th September, thus tallying closely.

Another fragment of papyrus found near by contained the following record (AZ. XXXVII. 93):

"Reckoning of . . . and . . . for one year.
Amount of six months' income for the temple scribe
Horemsef year 31."

Then the details follow for alternate months:

" . . from the 26th day of the 10th month to the 25th day of the 11th month.
" . . from the 25th of the 12th month to the 20th of the 1st month, year 31.
" . . from the 20th day of the 2nd month to the 19th day of the 3rd month.
" . . from the 19th day of the 4th month to the 18th day of the 5th month.
" . . from the 18th day of the 6th month to the 17th day of the 7th month.
" . . from the 17th day of the 8th month to the 16th day of the 9th month."

It will be noted that the whole year is regarded as

year 31, but that the transition from the 12th month to the 1st month is also regarded as a transition from the 30th to 31st year. We thus see two methods of reckoning, the former probably reckoning from the full moon (1st of lunar month) nearest the date of accession, and the latter from the first New Year's Day following accession.

From the fact that this fragment was near the fragments dated in the reign of Senousrit III. it was supposed also to be dated in his reign and I formerly accepted that hypothesis. That hypothesis is still astronomically possible if we accept the dates as New Moon dates, for the astronomical New Moon of November 3251 B.C. fell on 7th November (Julian) and would be visible on the 9th of the month corresponding to the 25th of the 10th month in Senousrit's 30th year, thus tallying approximately. If, however, as is more probable, they represent the first day to the end of each lunar month then they cannot refer to Senousrit III., for a full moon could not occur close to the 17th of the 8th month both in his 7th and 31st year. Further his actual accession was on the 14th of the 8th month (AG. XXIV., pp. 2, 71) so that the first lunar month after his accession would not begin in the 10th month.

The Turin Papyrus, however, states for the reign of Sebekneferura 3y. 10. 24. This may mean either that she ruled 3 years 10 months 24 days (*i.e.*, till the 24th of the 11th month in her 4th year) or 3 years and to the 24th of the 10th month in her 4th year. On the latter hypothesis the fragment under consideration belongs to the reign of her successor Khu-taui-Ra and represents the lunar months in the year of the 30 years' feast.

There are two types of Sed Festival, one held when the New Moon corresponded with the Rising of Spica, which it did at intervals of 27 or 30 years, and the other when the moons fell on the same dates of the stellar year

as in the year of the king's accession, namely (after he completed 30 years) throughout his 31st year. The 31st year of Khu-taui-Ra was 3150-3149 and the full moons tally as follows:

Recorded Dates	*Julian Equivalent*	*Computed Full Moon*
	3150 B.C.	
26th of 10th month Re Hor Khouti	=16th October	17th October
25th of 12th month Menkhet	=14th December	15th December
	3149 B.C. (leap year)	
20th of 2nd month Kaherka	=12th February	12th February
19th of 4th month Rekeh (great)	=11th April	11th April
18th of 6th month Renenouti	=9th June	8th June
17th of 8th month Khent Khat	=7th August	7th August

It will be seen that the discrepancies are not great. The full moon of June, the only one earlier than the recorded date, was not much more than an hour before midnight on the night of 8th-9th June. The date for the first of the lunar month may have been decreed beforehand by calculation, which may account for the slight discrepancies.

* * * * *

A zodiac,[82] known to be for the Rising of Sirius (14th July) in 2035 B.C. from the planetary positions given, shows the hieroglyph for the 20th day of the lunar month at the beginning of Leo. Calculation shows that 14th July was in fact the 20th day of the lunar month measured from Full Moon.

* * * * *

There are two dated Festivals of the first day of the lunar month in the reign of Thothmes III., one on the 21st of the 9th month (BM. 65) (Khent Khat) in the 23rd year of his reign and another on the 30th of the 6th month (Little Rekeh) in his 24th year. If reckoned from the accession of Thothmes his 23rd year would be July 1593 to June 1592 and his 24th year July 1592 to June 1591. The Sothiac cycle yields as equivalent dates 13th July 1593 and 23rd April 1591. If the month then began at

visible new moon this tallies exactly for calculation shows that the astronomical new moon occurred on 11th July 1593, becoming visible one or two days later, and on 22nd April 1591, becoming visible on 23rd or 24th.

. . . . .

The Kahoun Papyrus date of the Rising of the Sothis is the key date of Meyer's chronological theory. Following Borchardt he assumes that Sirius was the Sothis and that the 8th month was Pharmuthi and thus obtains c. 1876-1872 as the 7th year of Senousrit III. As explained elsewhere it is improbable that Sirius was the Sothis. If it was, however, Meyer's is the only consistent theory.

Nicklin, in 1900, after reading Lockyer's articles in *Nature* and recognising that, while the interval from the Rising of Sirius on a given date of the Wandering Year to its next rising on that date was 1461 Egyptian years or somewhat less, the interval from the coincidence of a given date of the wandering year with the Summer Solstice to its next coincidence was 1507 years, proposes the extraordinary theory that the Egyptians adjusted the calendar by inserting extra days so as to make the interval from the Rising of Sirius on a given date to the next occasion of rising on that date 1507 years. (CR. XIV. 148.) The effect of this would be to make the seasonal cycle about 1551 years instead of 1507. Precisely why the Egyptians would wish to do this he does not explain. As a result of his theory he deduced 1945 B.C. as Senousrit's 7th year, though this does not even fit his own theory correctly. He has, however, now published a pamphlet in which he states what he calls Manetho's (!) date (NE. i. 22) for Senousrit III. as 1888-1855. From this perhaps we may infer that he now recognises that Meyer's calculation is approximately correct if the Sirius Theory is accepted.

Sir Flinders Petrie agreed with Meyer's exposition of

the Sirius cycle but assumed that Senousrit was a complete cycle earlier thus dating him roughly 1460 years before Meyer's date. He has recently abandoned this and regards the date of Rising in the Kahoun Papyrus as referring to Sirius, not dated in the Wandering Year but a fixed year On this assumption (if the year were fixed relatively to the seasons) the date of Rising of Sirius would be almost exactly the same for a century. No other date of Rising of Sirius being recorded in terms of this supposed seasonal calendar no comparison can be made with the Kahoun date and Petrie therefore rightly regards it as impossible on this theory to make any use of this evidence for dating Senousrit. This theory is, however, untenable as I show in another note.[58]

Weigall accepting the Sirius Theory but assuming that Phamenoth was then the 8th month dates the 7th year of Senousrit III. at about 1990-1993.

Note 27. THE THIRTEENTH AND FOURTEENTH DYNASTIES.

The kings of the Thirteenth and Fourteenth Dynasties are placed approximately by means of the dates of conjunctions of Jupiter and Saturn.[9] Denderah seems to have been a centre of influence as late[29] as 2389 B.C. and the Fourteenth Dynasty may have had its capital here. Both dynasties probably paid tribute to the Hyksos during a portion at least of their existence.

Though Manetho stated the length of his second Tomos as 2121 years measuring from the beginning of the Twelfth Dynasty to some point in the Nineteenth Dynasty thus allowing a space of about 1500 years for the Thirteenth, Fourteenth, Fifteenth, Sixteenth, and Seventeenth Dynasties, the "short" chronologists allow about 200 to 300 years for the period. Breasted accepting Meyer's Twelfth Dynasty date and Sothiac Theory allows only 208 years. In support of this view he adduces the paucity of monuments. But with a hostile people in the North the Thebans would be frightened to send men away to the quarries in case there was a surprise attack. The Hyksos themselves were a nomad people not in the habit* of setting up monuments. Are we to suppose that they had no past before this period because we can find no traces of an earlier Hyksos civilisation in Arabia or elsewhere? Such negative evidence is of a very flimsy type to place against Manetho whose proved errors are very few. But Breasted, as if he had proof of what he writes, says "The figures

* Since the above was written Sir Flinders Petrie has made discoveries in Palestine which necessitate a qualification of this statement.

given in Manetho's scanty notes are not worthy of the slightest credence." If a judge on the bench thus insulted an "expert" witness we would not place much faith in the judge. Manetho has proved himself an "expert" in the portions of his chronology which can be checked.

Apparently as a further piece of evidence Breasted adds in a footnote "Under the Moslems 77 Viceroys held the throne of Egypt in 118 years, 750 to 868 A.D. In Europe some 80 Roman emperors after Commodus ruled in a period of 90 years (193-283 A.D.)." This shows that short reigns are possible. It does not show that they are probable. When we are compelled to choose between probability and possibility, it is the probability we must prefer. Manetho gave 60 kings for the Thirteenth Dynasty and 76 for the Fourteenth, 136 in all. About 118 of these have been traced on the broken Turin Papyrus and Manetho's figures for the numbers of kings are probably right or nearly so. In my chronology they ruled 937 years or an average of slightly less than 7 years each. I have not discovered any period in history in which 136 consecutive rulers averaged less than 2 years. Yet Breasted's figures require an average of 1⅓ years. There are many periods in history where 136 consecutive rulers averaged more than 7 years. It is safe to say that 48 different periods of 100 years in different countries could easily be found in which the average reign exceeded (often greatly exceeded) 7 years, while it is doubtful if any instances of average reigns under 2 years extending over a period of 100 years could be found except the two instanced by Breasted. The probability is therefore at least 48 to 2 against his chronology on this ground. (96 per cent. in favour of my theory, 4 per cent. in favour of his.)

Another theory has been advanced by the short chronologists that there was a great deal of overlapping from

the Thirteenth to the Seventeenth Dynasties, but Manetho as is apparent in other portions of his chronology always endeavoured to discount overlapping, and few will be found to-day so confident as formerly that there was overlapping to a large extent.

Hall makes no pretence of understanding the Sothiac cycle. (He misquotes the Kahoun Papyrus date as 1st Pharmouthi both in the *Encyclopædia Britannica* (EB. V. 64) and *Cambridge Ancient History* I. 168) but on historical grounds he feels that " to allow only two centuries for the period between Dynasties XII. and XVIII. is difficult " and concludes that " there must have been some mistake in the original observation of the star ; or possibly some change in the calendar was introduced. . ."

Meyer is so confident that his Sothiac theory is right that he sweeps aside the evidence of Manetho and the lists. " Il ne s'agit plus ici de calculer la durée de cette époque [the interval between Twelfth and Eighteenth Dynasties] après la liste des rois et les dates correspondantes mais bien plutôt de classer ceux-ci dans le court espace de temps qui est maintenant établi." (AG. XXIV. Pt. 2. 82.)

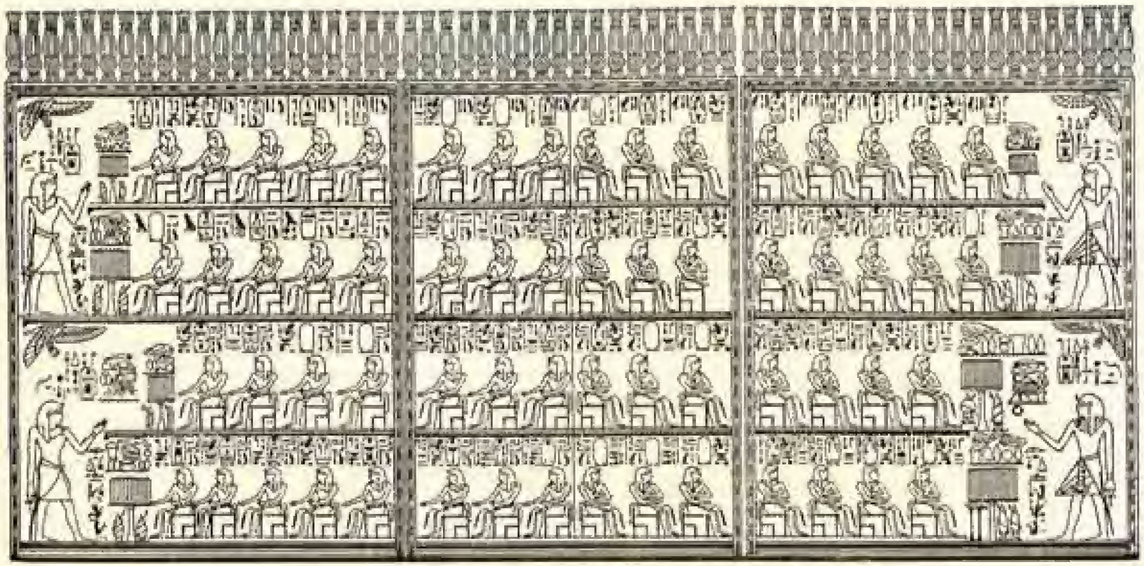

PLATE IV. THE TABLET OF KARNAK.

Reproduced by the kind permission of Sir Ernest Budge from his "History of Egypt."

See Note 28.

[*facing page* 165]

NOTE 28. THE KARNAK LIST.

A Tablet with symbols of 61 kings and their names was found by Burton near the sanctuary of the temple of Amen-Ra at Karnak. Thothmes III. is shown adoring his "ancestors" (BB. IX. 125-127). Half of the tablet shows kings facing left and the other half shows kings facing right. Owing to the fact that a Teta, Pepi, and Merenre mentioned are identified with the kings of that name in the Sixth Dynasty, it is thought that the list is not in chronological order: but if these are identified with Tetka-Ra (Dedkere-Shema), Sneferenkhre Pepi, and Merenhor of the Tenth Dynasty, the list like the other lists is seen to be possibly in chronological order with omissions.

Comparison of the reproduction* in Budge's History (BB. 127) with the kings' cartouches in his *Book of Kings* provides the following list:

Left Side		*Name in Karnak List*	*Name from Other Sources*	*Date in My Chronology*
First Line	1	Neferkara	Oneoophres	5467-5444
	2	Senefru	Snofru I.	4884-4854
	3	Sahure	Sahure	4551-4538
	4	An	Raenuser	4491-4447
	5	Assa	Zedkara	4438-4394
	6	(Erased)	—	
	7	(Erased)	—	
	8	Smen-taui-Ra	(? Ammonodotus	3701-3670)
Second Line	1	(Erased)	—	
	2	Antef	(? Antef)	c. 3600
	3	Ant . .	(? Antef)	
	4	Men(tuhetep)	(? Mentuhotep)	
	5	Antef	Uahankh-Intef	3554-3504
	6	Teta	Tet-ka-Ra	3512-3491
	7	Pepi	Sneferenkhre Pepi	3485-3457
	8	Meren-Re	Meren-Hor	3457-3432

* See Plate IV.

		Name in Karnak List	Name from Other sources	Date in My Chronology
Left Side				
Third Line	1	Sehotpeibre	Amenemhat I.	3393-3363
	2	Nubkeure	Amenemhat II.	3331-3290
	3	(Erased)	—	
	4	(Erased)	—	
	5	Maekherure	Amenemhat IV.	3194-3185
	6	Sobknofrure	Skemiophris	3185-3180
	7	Antef	(? Khu-taui Ra	3180-3142)
Fourth Line	1	Kheper-ka-Ra	—	
	2	Seqenen-Ra	—	
	3	Sekhent-neb-Ra	—	
	4	User-en-Ra	—	
	5	Nub-Kheper-Ra	—	
	6	Neb-hapt-Ra	—	
	7	Seneferka-Ra	—	
	8	. . . Ra	—	
Right Side				
First Line	1	. . . Kau. .	—	
	2	Suatchen-Ra	—	
	3	Sankhab-Ra	—	
	4	Sekhem-Khutaui-Ra	Sekhemketouire	3010-2965
	5	? Sekhem-nefer-taui-Ra	—	
	6	Kha-Sesesh-Ra	Khesekhemre	2908-2896
	7	Kha-Nefer-Ra	Kheneferre	2886-2821
	8	Kha-Kau-Ra	—	
Second Line	1	Kha-Ankh-Ra	—	
	2	Kha-hetep-Ra	Khehotpere	2817-2813
	3	Snefer . . . Ra	Mer-nefer-re	2802-2778
	4	. . . Ra	Marhotpere	2778-2776
	5	Sesuser-taui-Ra	Se . . . tu	2776-2773
	6	Mer-kau-Ra	—	
	7	Mer-Sekhem-Ra	Mersekhemre	2773-2770
	8	(Erased)	—	
Third Line	1	Sekhem-uatch-kau-Ra	—	
	2	(Erased)	—	
	3	(Erased)	—	
	4	Khu-taui-Ra	—	
	5	Mer-pab	—	
	6	Suatch-en-Ra	—	
	7	Uatch-kau-Ra	—	
Fourth Line	1	(Erased)	—	
	2	(Erased)	—	
	3	(Erased)	—	
	4	Sechem-uah-Kau	—	
	5	Suah-en-Ra	—	
	6	Snefer . . . Ra	—	
	7	. . . Ra	—	

It will be observed that prior to the Tenth and Eleventh Dynasties only a small selection of important kings is given. Neferkara may be one of several early kings of that name but Onenophres was probably the most important. An is known to be the same as Raenuser because both names are found on the same statue (BB. XXIII. 28).

Assa is usually regarded as the same as Zedkara but the identity is not perhaps so well established. The two erased names following may be of kings of the Sixth and Eighth Dynasties.

The Tenth and Eleventh Dynasties were contemporary and the second line of the left list begins with early princes of the Eleventh Dynasty and finishes with later kings of the Tenth.

The third line gives most of the kings of the Twelfth Dynasty. One of the erased names is fairly certain to be that of Senousrit III. The first Khutaui Ra may be the king designated as Antef, prince. It is supposed that he married Sobknofrure. After her death the kingdom became divided until Sekhemketouire reunited the native Egyptians (CA. i. 310). The Karnak List for the period following the Twelfth Dynasty no doubt preserves the more important kings of the Theban line from Kheper-ka-Ra to Sekhemketouire while the Turin Papyrus preserves the names of kings with their capital further North, though in the extreme North the Hyksos were already in possession. Kheper-ka-Ra happens to be the same reed and hornet name as was used by Senousrit I., but is, of course, that of a different king; nor is there any necessity to identify Seqenenra with a later king of the same name.

After Sekhemketouire there are a number of correspondences with the Turin Papyrus, but the names in the third and fourth lines on the right of the Karnak List are in many cases erased and the corresponding portion of the Turin Papyrus is too fragmentary for comparison. Khutaui Ra cannot (on the assumption that the List is in chronological order) be the same as the Khutaui Ra who succeeded Sobknofrure in the North.

The Karnak List probably does not extend further than to the end of the Thirteenth Dynasty.

NOTE 29. THE DENDERAH ZODIACS.

At the temple of Denderah in South Egypt (built in Roman times but probably on the site of an older temple) were found two zodiacs, one circular* and the other oblong. The signs of the zodiac resemble the signs of the Greeks and this and other indications have led to the view that the zodiacs are of late date. But it may be that they are late copies of old zodiacs. Certainly the similarity of the signs is no criterion for there is a zodiac[69] of 880 B.C. which has the Ram, Bull, Twins, etc., much as we know them, and in Persia we find similar names in the Avesta, the date of which is probably much earlier. As seems probable from the date of origin of the Babylonian zodiac (in which the names Bull, Twins, Lion, Fish, occur as early as the time of Sargon of Akkad) and date of origin of the Egyptian zodiac, the ear of corn representing Spica rising at the Vernal Equinox was the name given in Egypt as coinciding with harvest time there and as Sir William Peck showed the other signs also symbolise appropriate periods of the year on the assumption that the names were originally given in Egypt in the fifteenth millennium (MB. 135).

Of the two zodiacs the oblong one† is the more accurately spaced. It is enclosed between two figures, the left figure encompassing the six signs from Leo at her feet to Capricorn at her head and the right figure encompassing Aquarius (at her head) to Cancer (at her feet). Cancer is not actually shown for the appropriate space is taken up with the Hathor

* The circular one is supposed to have been inscribed in the time of Augustus and the oblong one in the first year of Nero.

† See Plate V.

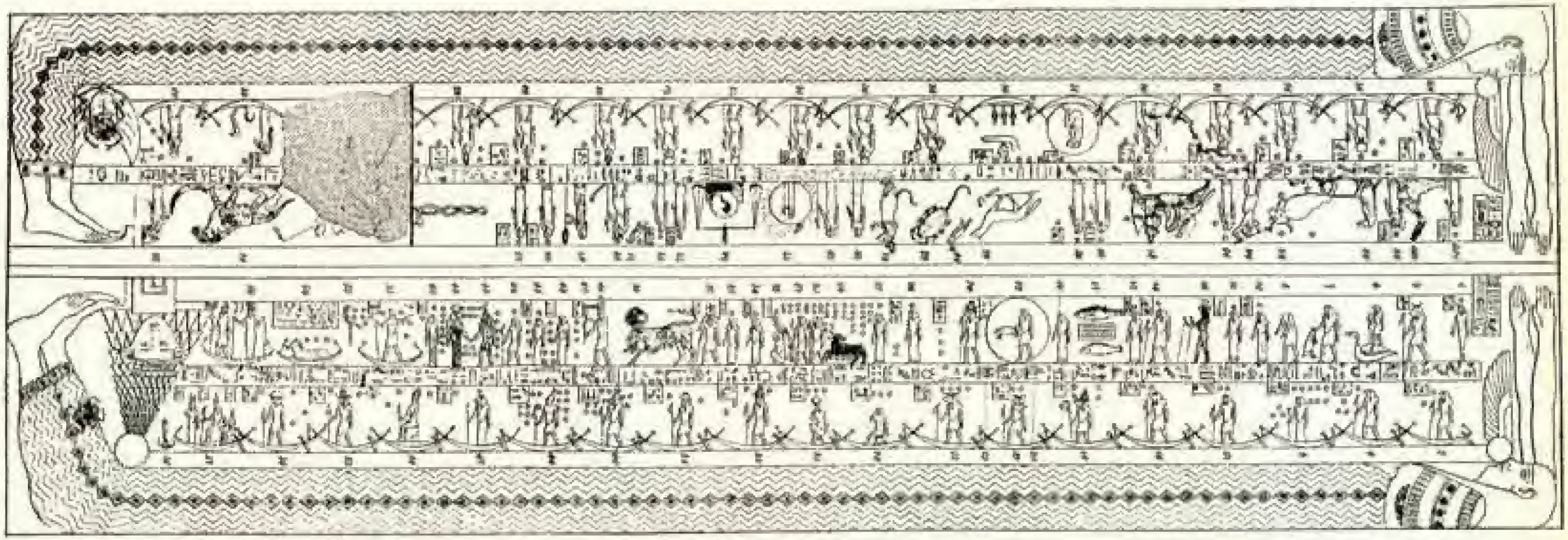

PLATE V. THE OBLONG DENDERAH ZODIAC.

Reproduced from the "Transactions of the Scottish Lodge of the Theosophical Society," 1893.
(The original source is not there stated. There are slight differences from the reproduction in Boll's "Sphaera," which should be compared.)

See Note 29.

(*facing page* 158)

cow indicating the position of wandering Hathor at the period of the figure, namely corresponding approximately to the rising of the stars of Cancer.

Now, in almost every known zodiac in oblong form the divisions between the two oblongs represent the approximate position of the Solstices. The Solstices in this case are therefore approximately between Cancer and Leo and between Capricorn and Aquarius. As the astronomers would not cut a sign in two this might only be accurate to within half a sign which represents a difference in date of about 1080 years. The position of Hathor in the figure, however, shows that the date was about 2385 B.C. (when 1st Hathor wandering corresponded approximately with 1st Re Hor Khouti of the fixed calendar, the heliacal rising of the stars of Cancer) with a latitude of say 60 years on either side since the position is not given precisely in the figure.

Further the figure shows a scarab, the symbol of rebirth, at the commencement of Leo. This I take to represent the Rising of Sirius with the Sun. It was the home of souls as shown by the position of the ba birds in one of the Athribis horoscopes[89] and by the use of the Pyramids as the abodes of the dead (the reborn). A scarab inscribed with the Heart Chapter (XXX.B.) of the *Book of the Dead* was placed as the heart of the mummy as early as the Middle Kingdom, and another chapter (LXIV.) of the *Book of the Dead* specifically identified the scarab with the heart. In the third millennium and earlier Sirius rose at the same time as the beginning of the sign Leo (300° to 330° from Spica) and this heart tradition has come down to late Egyptian times, the heart still being associated with that sign which was regarded by Ptolemy as ruled by the Sun (P. 42, 153).

In the latitude of Denderah Sirius rose about 13th

July very near the date of the Summer Solstice just about the same period, so that it seems probable that the oblong zodiac corresponds to a date near 2385 B.C.

Now if planetary positions were given the date could be determined precisely. Brugsch supposed that this was so and he was entitled to do so because in Egyptian there are written on the zodiac identifications of various symbols. Unfortunately these are clearly erroneous and must have been written by an Egyptian of the Roman period who did not understand the figure. Thus Jupiter is given in two different positions which as Boll pointed out is impossible. He suggested that the zodiac showed the sign rulership of the planets as in Ptolemaic Astrology in which Venus rules Taurus and Libra. This also is possible, but he has to admit that the identifications of Jupiter and Mars do not tally with the Ptolemaic sign rulership. We may therefore disregard the late Egyptian comments and examine the symbols *de novo*.

It will be observed that beneath each section of six signs there are 18 figures in boats (and Nos. 57 and 58 additional). The first idea that occurs is that these represent the 36 decanates (divisions of the zodiac of 10 degrees each). This may be so, for with some exceptions the figures round the edge of the circular zodiac* correspond. It is to be noted, however, that in both cases the Cynocephalus is interpolated at the end of Scorpio or beginning of Sagittarius. Now the Cynocephalus symbolised nightfall. It appears on the majority of water-clocks of which the primary purpose was the measurement of the hours of night, and it guided men to the underworld. Both figures thus indicate a date when Sagittarius rose after nightfall, and, therefore, when the end of Taurus or beginning of Gemini rose at sunrise.

It will further be noted that not only is the New Year's

* See Plate VI.

PLATE VI. THE CIRCULAR DENDERAH ZODIAC.

Reproduced from the "Transactions of the Scottish Lodge of the Theosophical Society."
(Compare the reproductions in Cole's "Tentyra," Boll's "Sphaera" and Biot's "Recherches.")

See Note 29 *(facing page* 161)

Day of the Wandering Calendar shown by a parrot on a perch (No. 52) before Wandering Hathor both in the oblong and circular zodiacs (No. 37), but the circular zodiac also shows a cowheaded figure (No. 60) holding a parrot on a stick symbolical of the New Year of the Egyptian fixed calendar which began with fixed Hathor and the rising of the stars of Libra. Both figures show a Cynocephalus also near Aries with the New Year bird on its head indicating that on New Year's Day of the fixed calendar the constellation Cynocephalus and the stars of Aries rose at nightfall. (Possibly it was precisely because on the New Year's Day, the date of heliacal rising of Spica, the Cynocephalus rose at nightfall that it came to have the general significance of the herald of night. In one text of Teucer we read (SB. 16) in regard to the sign Aries (*κριός*). "*τῷ μεν πρώτῳ δεκανῷ παρανατέλλουσιν ἡ Ἀθηνᾶ . . . . . . καὶ ὁ κυνοκέφαλος ὁ τὰ λύχνα φέρων . . . .*" Obviously it would never have been specially connected with nightfall if the Rising of Sirius was originally the New Year's Day and not Spica's Rising, for Aries is opposite Libra, not Cancer or Leo. In the late period the Rising of Sirius (Thoth) was, however, the New Year's Day and Horapollo in consequence thought that the Cynocephalus was sacred to Thoth. It possibly was the constellation now known as Perseus, though, if so, Teucer himself did not know this since he mentions Perseus as a different Constellation.) The oblong zodiac also shows a lion's head and paws in the circle below the scales (No. 74). This was later used as a hieroglyph symbolising the beginning of the year.

So far we have only fixed the approximate period of the zodiacs. In the circular zodiac, however, there is a serpent (No. 33) at the end of Taurus or beginning of Gemini. It, as we have seen, is the symbol of eternity and possibly represents[16] the conjunction of Jupiter and Saturn.

This is borne out by the figure above it (No. 34) which is more clearly shown in the reproduction in Boll's *Sphaera* as a figure with a flail which is presumably Osiris* (Jupiter) in the Zet Festival. The bird that follows him may therefore represent Saturn.

If this is so the only year to which it can refer is 2389 B.C. when Jupiter rose on 24th May in Taurus, Saturn having newly risen on 21st May. The Sun itself was in the beginning of the constellation Gemini. This is partly confirmed by the position of the pig (No. 29) sacred to Set (Mars). It is shown under the Bull. Strictly speaking if the signs are considered as 30 degrees each measured from Spica it was out of Taurus into Gemini, but a number of stars of Taurus extend beyond that limit into the Gemini section. Its position must have been calculated for it was invisible. Mercury and Venus were in Cancer. It is possible that the figures below the Crab (40 and 55) represent them.

It so happens that this was the same conjunction to which Hammurabi appears to have attached importance at the Era of Nisin (MB. 29ff.) being the nearest conjunction to the Spring Point in about 800 years.

The oblong zodiac is for a different date for the Serpent is in Virgo, but it is for roughly the same period of year. The Moon is shown in the horns of the Bull so that it is probably for the New Moon of Taurus. This corresponds to 1st Nisan, the New Year of the Babylonian calendar, and shows the " Semitic " influence operating in Egypt through the Hyksos at that time. The conjunction of Jupiter and Saturn referred to, however, is that near Spica,[9] to which the Egyptians paid great importance. Calculation of the positions of Jupiter and Saturn shows that the year

* Osiris, however, was often associated with Orion and the figure might conceivably represent Orion here as some suppose.

in question must be 2409 or 2408 B.C. when they were not far from conjunction on the Babylonian New Year's Day.

But the date of their rising in conjunction was near the date of Rising of Spica, indeed nearer than it would be again till the Eighteenth Dynasty.

. . . . .

In the same temple it is recorded* that the Sun rose (with Spica) at the same place (in the calendar) for the third time. This is in accord with my theory that the 365 day calendar was instituted about 5578 B.C. for at the time of this zodiac it was already into the third cycle. With this the statement of Herodotus may be compared that (by the Seventh Century B.C.) the Sun had "on four several occasions moved from his wonted course, twice rising where he now sets and twice setting where he now rises" (II. 142). The first cycle began about 5578, the second about 4182, the third about 2736, and the fourth about 1317, so that the Seventh Century was half-way through the fourth cycle. Herodotus' statements are, however, mutually contradictory and it is quite legitimate to understand from the second portion that there had only been two cycles and that the calendar began as late as 2736 (which is, however, impossible for many reasons which I have elsewhere stated).

. . . . .

In Petrie's *Denderah* the results of his classification of undated tombs at Denderah is given (Ch. II.). He classifies these into 8 groups from A to H according to the style of sculpture, form of the tomb, position of the tomb, and contents of the tomb. The earliest Group A he assigns to the time of Dynasties III. and IV. and the last 4 Groups E F G H to Dynasty XI. He remarks,

* The record probably being merely a copy of the original record in the older temple.

however, that it is "unsatisfactory to have class E with such names as Antef and Mentuhotep separated by F and G from class H in which the names of the Eleventh Dynasty rule again." Now among the names in Group F occur Sebekhotepa, Hotepa, Nemy, which suggest rather Thirteenth Dynasty names for among the Thirteenth Dynasty kings in the Turin Papyrus the name Sobkhotpe is frequent, and Sehotpeibre and Nemaetenkhe are found.

In Group G are the names Menhotepa and Nefertkau, reminiscent of Mentuhotpe, Menhotpere, and Neferenkhre, also names of kings of the Thirteenth Dynasty. The name Mentuhotep again occurs in Group H. Hennu recalls the name of Princess Henut of the Thirteenth Dynasty. The name Beba is also found in this group and resembles the name of Bebi, one of the princes towards the end of the Thirteenth Dynasty.

Similar names may also have occurred in the Fourteenth Dynasty so that it may quite well have been a period of activity in this region, and the resemblance of names in Group H to Eleventh Dynasty names may be pure chance owing to the fact that names like Antef and Antefaqer may have again occurred in the Fourteenth Dynasty period. The possibility of this is shown by Newberry's examination of a scarab inscribed "The Royal Son, Antefa." He says, (NS. 129) "From the style of the cutting and back of this scarab I should be inclined to recognise in this Antefa one of the princes of the intermediate period between the Thirteenth and Seventeenth Dynasties rather than a prince of the Eleventh Dynasty."

NOTE 30. THE HYKSOS.

The *Book of the Sothis*[31] as quoted by Syncellus is proved to be inaccurate in the lengths of reign given for individual kings where it can be checked from the Eighteenth Dynasty onwards, but it is not quite so inaccurate or so useless for chronological purposes as is often represented, showing an error of less than 6 per cent. in the total of regnal years from the beginning of the Eighteenth Dynasty to the end of the Twenty-sixth Dynasty, and, with the exception of five kings' names, giving the names of the kings in correct order except that the Twenty-second and Twenty-third Dynasties are transposed.

In its list of kings earlier than the Fifteenth Dynasty to whom it allots 701 years, it is probable that at least 50 per cent. of the names given are names of kings in approximately the correct order and that the total 701 years is not wrong by more than 210 years (30 per cent.) and possibly not wrong by more than 10 years. It is quite possible, however, that the figure 701 was arrived at in an effort to make the period tally with a statement of Manetho (quoted by Syncellus) that the Hyksos conquered Egypt in the 700th year of a Sothic cycle.

But what Manetho probably said was that the Calendar Reform of Aseth was in the 700th year of a Sothic cycle which on astronomical evidence appears to be very nearly accurate[32].

If, however, the figure 701 is approximately correct for the reigns of Hyksos before the Fifteenth Dynasty it follows that Mestraim with whom the *Book of the Sothis*

commences cannot be identical with Menes, as stated by Syncellus, for 701 years before the Fifteenth Dynasty only takes us back to 2999 B.C. The Bible also refers to Mizraim as a "son" of Ham and therefore assigns to him a date later than the time of the Biblical and Babylonian Flood (3189 B.C.). Still another clue is afforded by Petrie's recent important finds at Beth Pelet which show a steady variation in type of Hyksos scarabs beginning with a style closely akin to that of the Twelfth and Thirteenth Dynasties, implying that there were Hyksos in contact with Egypt from a much earlier period than that of the Fifteenth Dynasty.

As in the Bible Mizraim was related to Nimrod ("son" of Cush, *i.e.* an Arabian) whom I identify with Naram Sin, it is probable that all Hamites really belong to the race misnamed "Semites" and that Mizraim and his successors in the Sothis List were Hyksos. My list of early Hyksos kings is therefore taken directly from the *Book of the Sothis* (except in the alteration of the place of Mizraim) and where the Egyptian form of the names has been found on scarabs or elsewhere I have added it in brackets. It will be noted that the order of the kings whose scarabs are known does not unduly conflict with the scarab sequence indicated in Petrie's *Historical Studies*.

Khyan's scarabs are early in type and he must be identified with Ham, not with Certus of the Fifteenth Dynasty, as is usually stated. The name of Certus is given in five different forms—Certus (Sothis book), Iannas (Josephus), Samnas (Lat. version), Anan (Eusebius' Armenian version), and Staan (Africanus). Not one of these names resembles Khyan as closely as Ham does.

The Bible calls Mizraim the "son" of Ham. This may simply mean descendant. Maqrizi quoting Abd El Hakim shows nine generations (AE. 1924.51) from Ham to

Guriaq, whom I identify with Curudes. Ham probably ruled the whole of Palestine and also penetrated the Egyptian delta, perhaps even exacting tribute from South Egypt. On his death, however, his kingdom was divided, his grandson Mizraim eventually becoming ruler of part of Egypt while other descendants ruled in Palestine and in Arabia. Naram Sin, the Arabian who ruled in Babylonia from 2814 to 2777, would not be literally a grandson as the Bible states but merely a descendant.

Khyan (Ham) has left many traces of his greatness, his influence being shown as far as Crete and Babylonia, and probably had a long reign.

Until the time of the Fifteenth Dynasty king, Sanati, the Hyksos probably only intermittently exacted tribute from the South and their period of real supremacy may only have begun in 2243 on the fall of the Fourteenth Dynasty (or 2213 if the commencement of the Thirteenth Dynasty is dated by Eratosthenes' List[9] instead of the Turin Papyrus). Apophis II. of the Sixteenth Dynasty was perhaps the Apophis in whose reign Joseph lived.

Their time of domination, however, was interrupted (in the Sixteenth Dynasty period) by the Assyrian Queen Semi Ramis (=Sharma Adad II.), *c.* 1960-1930, who claimed to have conquered Egypt. Her claim is fully borne out by an Arab tradition that Sheddâd invaded Egypt and conquered the country and that "he" and his "descendants" held sway for more than 200 years in Lower Egypt (FH. 11). "Descendants" is probably an error. But the Hyksos may after the invasion have considered themselves as subject to the Assyrians. Thus what at a slightly earlier period had been feared by Salitis came to pass.

As the Eighteenth Dynasty began in 1709 "more than 200 years" is a close approximation to the interval from Semi Ramis to that time.

According to Brugsch the monuments describe the foreigners who governed Egypt as Men or Menti, and in the table of nations on the walls of the temple of Edfu, the Menti are inhabitants of the land of Asher (possibly equivalent to Ashur). Thus though Manetho describes the Hyksos as Phoenicians the real sovereigns may latterly have been Assyrians, while the Hyksos Kings acted as their viceroys.

NOTE 31. THE BOOK OF THE SOTHIS.

The *Book of the Sothis* is a late compilation containing the names of 86 kings from Mizraim to Amosis. Examination shows that the author has put together two lists. The first 32 kings to Aseth are from a list of Hyksos kings (Mizraim having been erroneously identified with Menes by the author or Syncellus who quotes the list). The remaining 54 kings are Egyptian kings beginning with the Eighteenth Dynasty.

Of the Hyksos the only kings whose names are given by Manetho are those of the Fifteenth Dynasty when they became dominant. Their lengths of reign, given in Josephus' version of Manetho, tally closely with those in the Sothis book as follows:

Josephus	*Years of Reign*	*Sothis Book*	*Years of Reign*
Salitis	19	Silites	19
Bnon	44	Baeon	44
Apachnan	36y. 7m.	Apachnas	36
Apophis	61	Apophis	61
Iannas	50y. 1m.	Sethos	50
Aseth	49y. 2m.	Certus	29 or 44
		Aseth	24

It is quite possible, therefore, that the list of Hyksos from which the author copied was fairly accurate, and it has accordingly been used in the Chronology.

The list of Egyptian kings which he has tacked on immediately after the Fifteenth Dynasty (which he assumed to be the Seventeenth) is inaccurate in regard to the lengths of reign of individual kings but not very inaccurate either in regard to the order of their names or the lengths of the Dynasties. The total of the years from the beginning of the Eighteenth to the end of the Twenty-sixth Dynasty

amounts to 1250 years in place of the correct total of about 1180 years, a discrepancy of less than 6 per cent. Probably the list from which he copied had no regnal years and he made a rough estimate from his knowledge from other sources, knowing the approximate length of the whole period.

The kings named by him may be identified as follows:

EIGHTEENTH DYNASTY.*

Names in correct order	*No. in Sothis Book*	*Name in Sothis Book*
Amos	33	Amosis
Amenophis	35	Amemphis
Chebron	34	Chebron
Sister of Amesses	36	Amenses
Mefres	38	Misfres
Misfragmouthosis	37	Misfragmouthosis
Touthmosis	39	Touthmosis
Amenophis II.	40	Amenophthis
Horus	41	Oros
Achencherres	42	Achencheres
Rathos	43	Athoris
Chebres	44	Chencheres
Acherres	45	Acherres
Ramesses		
Armesis	46	Armaeos

NINETEENTH DYNASTY.

Seti		
Ramses	47	Ramesses
Merenptah	48	Amenophis
Seti (User Kheprura)	50	Nechepsos
Ramesses	51	Psammuthis
Amenemnes	52	. . .
Tausert and Siptah	49	Thuoris
Setnekht (User-Khaura))	53	Kertos

TWENTIETH DYNASTY.

Ramses III.	54	Rampsis
Ramses IV.	55	Amenses
Ramses V. (Sekheperenre)	56	Ochyras
Ramses VI. (Amenkerkhepeshef)	57	Amendes
Ramses VII. (Itamun)	59	Athothis
Ramses VIII. (Akhenamen)	60	Kenkenes
Ramses IX. (Neferkere)	61	Uennephis
Ramses X.	58	? Thuoris
Ramses XI. (Khaemwese II.)	62	Susakeim

* The Sothis Book does not divide the kings into dynasties but simply gives the names in sequence.

TWENTY-FIRST DYNASTY.

Names in correct order	*No. in Sothis Book*	*Name in Sothis Book*
Hrihor (Nephelcheres)	65	Nephercheres
Smendes	—	—
Paynozem (Psousennes)	63	Psuenos
Amenophthis	64	Ammenophis
Siamon	66	Saites
Pesibkhenno II.	67	Psinaches
(Paynozem II.)	—	—

TWENTY-SECOND DYNASTY.

Sheshonk I.	71	Koncharis
Osorchon I.	72	Osorthron
Takelot I.		
Osorchon II.		
Sheshonk II.		
Takelot II.	73	Takalophis
Sheshonk III.		
Pemou		
Sheshonk IV.		

TWENTY-THIRD DYNASTY.

Petoubates	68	Petubastes
Osorcho	69	Osorthron
Psammous	70	Psammos
Zet		

TWENTY-FOURTH DYNASTY.

Bocchoris	74	Bokchoris

TWENTY-FIFTH DYNASTY.

Sabakon	75	Sabakon
Sebichos	76	Sebechon
Tarkos	77	Tarakes

TWENTY-SIXTH DYNASTY.

	? 78	Amaes
Stephinates	79	Stephinathes
Nechepsos	80	Nechepsos
Nechao	81	Nechos
Psammetichus	82	Psammitichos
Nechao 2nd	83	Nechao
Psammouthis	84	Psamuthes
Ouaphris	85	Uaphris
Amosis	86	Amosis

It is clear that in the Eighteenth and Nineteenth Dynasties errors of order are scarcely greater than those in Africanus' List. For the Twentieth Dynasty[48] we have no record at all from Africanus, while the list of the Sothis

book is approximately correct. Perhaps even Thuoris should be in the position there stated, for our information in regard to the kings of this dynasty is scanty. The Graecised forms Athothis, Kenkenes, and Uennephis are similar to the Graecised forms of names of First and Second Dynasty kings. Uennephis is here seen to be the equivalent of Neferkere, just as Onenophes (or Onnofris) was the equivalent of Neferkere of the Second (Africanus' " First ") Dynasty. " On " and " Re " (or Ra) are thus seen to be equivalent. Ra is the Sun god and On is also, as is further borne out by the fact that the City of On was called the City of the Sun god (Heliopolis) by the Greeks.

For the remaining dynasties the order given is as correct as that of Manetho, save that the Twenty-second and Twenty-third Dynasties are transposed. Like Eusebius the Sothis book named only three of the Twenty-second Dynasty kings, but including coregencies these three ruled nearly the whole period of the Dynasty.

In the whole list from the Eighteenth Dynasty the following are the only kings out of order Nos. 35, 38, 49, 58, 65 (not counting the transposition of the Twenty-second and Twenty-third Dynasty), 5 kings out of 54, not a very great error.

PLATE VII. THE ZODIAC IN THE RAMESSEUM—RIGHT HALF.

Reproduced from Lepsius' "Denkmäler," III. 170.

See Note 32. (*facing page* 178)

NOTE 32. THE REFORM OF ASETH.

In Lepsius' *Denkmäler* (LD. 170-171) there is reproduced a copy of a figure of the heavens* from the Ramesseum. The figure shows 12 sections containing what may be presumed to be the 12 signs of the zodiac of the Constellations. Above these are the symbols of the months of the Wandering Year. The first month is above the 7th sign.

Now the Babylonians measured their zodiac of the Constellations from Spica, dividing the circle of the zodiac into 12 sections of 30 degrees. The Egyptians attached great importance to the Rising of Spica in the Sed Festivals, and in the Esneh Calendar[68] the day of its rising is called the New Year of the Ancients. Also in one of the two Athribis Zodiacs[69] the Sothic symbol is opposite Spica at the beginning of Libra. It seems probable therefore that the Egyptians also measured their zodiac from Spica and that this figure shows the signs in succession starting from the right (LD. 170) namely, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces, Aries, Taurus, Gemini, Cancer, Leo, Virgo. This is confirmed by several features. Thus there are two tortoises in the 10th sign. These would be expected to correspond to Cancer for the tortoise is shown allotted to Cancer in the Roman Altar of Gabii (HM. II. xvi.). The 4th sign shows a goat and thus corresponds correctly to Capricorn. Further, in the bottom row of pictures the Cynocephalus is shown in line with the New Year of the Wandering Calendar and the beginning of the 7th sign. Now the normal position for the Cyno-

* See Plates VII. and VIII.

cephalus was opposite Aries[59], so this further strengthens the hypothesis that the 1st sign was Libra (and thus the 7th Aries).

In the middle of the second row is an animal erect on its hind legs. It apparently presides over the year. In front of it are the same signs as are found in the zodiac[58] of 880 B.C., in which the first month of the Wandering Calendar also happened to begin with Aries.

The symbols of the planets Osiris, Horus, Set, Isis, and Nephthys are read by Mahler as in the first month, fourth, fifth, sixth and end of second months respectively, in other words in Aries, Cancer, Leo, Virgo and end of Taurus. They are to be identified from other evidence[60] with Jupiter, Venus, Mars, Mercury[61] and Saturn. On the average they would all be in the signs stated theoretically about one day in 681 years, but in the year in which the combination occurred the probability is that it would last more than one day, and therefore that the interval from one period of occurrence to the next would be usually several times as long.* We are limited in our search by the supposition that the figure must represent a date at or earlier than the time of building of the Ramesseum.

A search discloses that the position of the planets on 14th July, 2035 B.C. tallied closely with the position in the figure, the approximate positions in the zodiac of the Constellations measured from Spica being as follows: Jupiter, Aries 12; Saturn, Taurus 29; Venus, Cancer 17; Mars, Leo 30; Mercury, Virgo 1. It is a remarkable coincidence that the date found is that of the Rising of Sirius in the year in question. The date in the year is confirmed by the fact that the sign of the 20th day of the lunar month is shown in the fifth month of the Wandering Calendar (AZ.

* In fact no other date tallies between this date and the time of Ramses. A date might conceivably be found earlier but not later.

PLATE VIII. THE ZODIAC IN THE RAMESSEUM—LEFT HALF.

Reproduced from Lepsius' "Denkmäler," III. 171.

See Note 32. (*facing page 175*)

XXVIII. 33) as presumably the date of the figure. As the lunar month began originally at Full Moon[38] and the Festival of the New Moon was on 8th July in 2035 B.C. the 20th of the month would be about 14th July. The chance of the planets being in any given 5 signs on a particular day is theoretically about 1 in 248,832 (but the fact that in this case Venus is in Cancer and Mercury in Virgo of necessity limits the date to one not far from the date of rising and in one sense makes the chance less remote. On the other hand one is entitled to argue that the objector has not admitted any connection with the Rising of Sirius and therefore it is pure chance that Venus and Mercury were in these signs in the figure and may be so regarded when calculating the chance of coincidence).

Now it so happens that Hathor of the Wandering Calendar was at that period approximately coincident with the Rising of the stars of the 7th sign Aries, and the month symbol above the 7th sign of the zodiac in the figure is that of the first month. It therefore shows Hathor as the first month, and this is entirely in keeping with the other evidence which shows fixed Hathor as the first month of the fixed Civil Calendar. This figure therefore shows a Half Cycle of Sothis with the months of the Wandering Calendar numbered as they probably originally were when the 365 day calendar was introduced (though not with the same numbers as that of the old sacred lunar calendar[39]). The same epoch appears to be denoted in the astronomical ceiling in the tomb of Senmut.[40]

We know, however, from the Ebers Calendar[37] that by the time of the Eighteenth Dynasty a reform had taken place and that Menkhet was then the first month. There is also a statement by the writer of the *Book of the Sothis* that Aseth, one of the shepherd kings, reformed the calendar by introducing the five epagomenal days. But there is ample

proof that the five epagomenal days were in the calendar long before the time of the Hyksos, and this may be a misunderstanding of the change from Hathor to Menkhet as first month which necessitated the dropping out of the epagomenae before Hathor and their reinsertion before Menkhet.

Now it so happens that on Manetho's reckoning 2035 B.C. would fall about the time of Aseth, and it seems highly probable that the figure in the Ramesseum represents the important Era of his Reform at the Half Cycle of Sothis, showing the Calendar as it was before the Reform took place. In the reformed fixed calendar the date of Rising of Sirius would be the date when it was decided as to whether it was necessary to insert a 6th epagomenal day.

Still another piece of evidence is fortunately preserved which may bear on this question. In the Rhind Mathematical Papyrus dated ". . . the 33rd year, 12th month . . . day under the king Aa-user-ra" Apophis of the Fifteenth Dynasty, there is a jotting added afterwards of about the same period "Year 11, 1st month, day 3, birth of Set. The majesty of this god caused his voice (to be heard). Birth of Isis. The heaven rained." Now ordinarily the birth of Set corresponds to the 3rd epagomenal day, and the birth of Isis to the 4th, but here they correspond to the 3rd and 4th days of the first month. Weigall has suggested (WH. I. 35) that this date falls in a year in which the calendar was reformed and that the 5 epagomenae were omitted. I now adopt his suggestion (though not his theory of the nature of the reform).

The evidence seems complete to date the Reform of Aseth in his 10th-11th year and to regard him as later than Apophis, as is the case in the list of the Sothis Book.

Thus the Rising of Spica on 17th September 2036 B.C. coincided with 1st Khonsou. On the date of the astro-

nomical figure 14th July 2035 B.C., which corresponded with 26th Rekeh great, Aseth decreed that when the next fixed Tekhi ended on 12th August 2035 B.C., fixed Menkhet, beginning on 13th August, was to become the first month and when the next wandering Tekhi ended on 13th February 2034 B.C., wandering Menkhet was to become the first month of the Wandering Calendar instead of Hathor and that the epagomenae were to be omitted in the Wandering Calendar for that one year only (thus having a year 18th August 2035 to 14th July 2034 in which both Spica and Sirius rose on the first of a month of the Wandering Calendar and in which the first day of every month of the fixed calendar corresponded with the first day of the exactly opposite month of the Wandering Calendar) and to be inserted between Tekhi and Menkhet in the next year. The date 11th year, 3rd of first month, Birth of Set thus corresponded to 16th Feb. 2034 B.C.

The following tables show the correspondence of the calendar of the wandering and fixed years before the reform and after it.

Wandering	*Fixed*	*Julian Date*
		2036 B.C.
1st Khonsou	1st Hathor (1st month)	17th September (Rising of Spica)
1st Khent Khat	1st Kaherka	17th October
1st Epet	1st Shefbedet	16th November
1st Re Hor Khouti	1st Rekeh, great	16th December
		2035 B.C.
1st Tekhi	1st Rekeh, small	15th January
1st Menkhet	1st Renenouti	14th February
1st Epagomenal Day	1st Khonsou	16th March
1st Hathor (1st month)	6th Khonsou	21st March
26th Hathor	1st Khent Khat	15th April
26th Kaherka	1st Epet	13th May
26th Shefbedet	1st Re Hor Khouti	14th June
26th Rekeh, great	1st Tekhi (11th month)	14th July (Rising of Sirius)
26th Rekeh, small	1st Epagomenal Day	13th August
1st Renenouti	1st Menkhet (1st month)	18th August
1st Khonsou	1st Hathor	17th September (Rising of Spica)

Wandering	*Fixed*	*Julian Date*
1st Khent Khat	1st Kaherka	17th October
1st Epet	1st Shefbedet	16th November
1st Re Hor Khouti	1st Rekeh, great	16th December
		2034 B.C.
1st Tekhi	1st Rekeh, small	15th January
1st Menkhet (1st month)	1st Renenouti	14th February
1st Hathor	1st Khonsou	16th March
1st Kaherka	1st Khent Khat	15th April
1st Shefbedet	1st Epet	15th May
1st Rekeh, great	1st Re Hor Khouti	14th June
1st Rekeh, small	1st Tekhi	14th July (Rising of Sirius)
1st Renenouti	1st Epagomenal Day (6 epagomenal days in this year)	13th August
7th Renenouti	1st Menkhet (1st month)	19th August
7th Khonsou	1st Hathor	18th September (Rising of Spica)
7th Khent Khat	1st Kaherka	18th October
7th Epet	1st Shefbedet	17th November
7th Re Hor Khouti	1st Rekeh, great	17th December
		2033 B.C. (leap year)
7th Tekhi	1st Rekeh, small	16th January
1st Epagomenal Day	25th Rekeh, small	9th February
1st Menkhet(1st month)	30th Rekeh, small	14th February
1st Hathor	30th Renenouti	15th March
2nd Hathor	1st Khonsou	16th March

The reform was necessitated from the fact that in 2036 B.C. 1st Hathor of the fixed calendar owing to precession no longer coincided with the seasonal date about 11th July, Gregorian (24th August, Julian) with which it corresponded at the introduction of the 365 day calendar. The new first day, 1st Menkhet, 1st-2nd August, Gregorian (18th-19th August, Julian) partially corrected the error. 1st Tekhi, 27th June, Gregorian (14th July, Julian) would have been too soon and a further one month change in the calendar was therefore delayed till later.

The one month reform was long overdue for Spica's Rising had changed one month relatively to the seasons about 2160 years after the calendar was instituted, namely about 3418 B.C., 1383 years before the Reform of Aseth. But when one remembers that the Julian calendar though known to be in error was not reformed to correct it relatively tc the seasons till nearly 1600 years elapsed (much longer in

Britain) one need not be surprised that the Egyptians delayed till 2035 B.C. before making the adjustment, even though the nature of the Gregorian Reform is not strictly analogous.

It is worth noting that reference is made to the Sothiac Cycle in the old Chronicle at the end of the Fifteenth Dynasty. The reference may be to this Half Cycle, for reference is again made to it as occurring toward the end of the Twenty-Sixth Dynasty (SD.). 1st Phamenoth corresponded with the Rising of Sirius in 578 B.C. exactly as it (Rekeh, small) had done in 2034 B.C.

NOTE 33. THE FIFTEENTH DYNASTY.

The date of Aseth is obtained from the Astronomical figure in the Ramesseum[33] taken in conjunction with the Rhind Papyrus. There are several variations of Manetho's list of kings of the Fifteenth Dynasty, but that of Josephus tallies so closely with the list in the *Book of the Sothis*, the two lists thus in a measure confirming each other, and the evidence of the Rhind Papyrus as now interpreted indicates that Aseth was later than Apophis, so that—contrary to my previous view—I depart from Africanus here. For the period after Apophis the Sothis book gives 3 kings in 103 or 118 years, while Josephus gives 2 kings in 99 years. I have adopted the 118 year period but either of the other two might quite well be right.

The Twelfth Dynasty ended about 3180 and Manetho gave the lengths of the Thirteenth and Fourteenth Dynasties as 453 and 484 years, bringing us down to 2243 B.C. He was usually careful to avoid overlapping in his chronology but as he begins the Fifteenth Dynasty with Salitis this on my reckoning yields an overlap of 36 years. On the other hand Africanus' version of the Twelfth Dynasty makes it 160 years in length while my figures give 193, a difference of 33 years, which nearly counterbalances the overlap. There may have been kings of the Thirteenth Dynasty earlier than Khutauira contemporary with the end of the Twelfth Dynasty and Manetho's Thirteenth Dynasty should perhaps correctly be reckoned from a date earlier than 3180.

The Hyksos apparently attained their greatest power in the Fifteenth Dynasty but had been in North Egypt long before that.

Note 34. THE SIXTEENTH AND SEVENTEENTH DYNASTIES.

The period of the Sixteenth and Seventeenth Dynasties is very obscure. Information derived from Manetho indicates domination of the Hyksos of about 511 or 518 years. Assuming that their domination began about the beginning of the reign of Salitis of the "Fifteenth" Dynasty (2298 B.C.), 278 years of the domination would be in the "Fifteenth" Dynasty and 240 in the "Sixteenth." Eusebius gives 250 for the duration of the Sixteenth. The Hyksos, however, were still part rulers of Egypt (possibly as viceroys of the Assyrians) till driven out at the beginning of the Eighteenth Dynasty. From the end of the "Fifteenth" Dynasty, about 2020, to the beginning of the Eighteenth, 1709, is 311 years. The Excerp. Barb. gives "at Memphis 318" and this may have been the actual length of the Dynasty though it was not dominant during the whole period.

When the period of dominance ended about 1780 the Theban kings became supreme or at least were regarded as such by the Egyptian chronologists. 1793 fell in the reign of Opehtiset Nubti and he may still have been reigning in 1780. The Dynasty of Thebans now succeeding called the "Seventeenth" Dynasty had probably been ruling locally long before, possibly being the immediate successors of the Fourteenth Theban Dynasty and thus ruling from 2243 to 1709, 534 years, though their period of dominance was only during the last 71 years.

NOTE 35. THE STELA OF YEAR 400.

Seti, an important official of Ramses II., erected a stela at Tanis in honour of the god Set (Mars) dated in the fourhundredth year of King Opehtiset-Nubti (BR. III. § 538) in the fourth month of the third season on the fourth day. The monument shows Ramses II. offering wine to Set, and records a prayer of Seti's (§ 542) "Hail to thee, O Set, son of Nut, great in strength in the barque of millions of years overthrowing enemies in front of the barque of Re, great in terror,—(grant me) a happy life following thy ka, while I remain in . . . ."

Now the phrase "millions of years" is used only in connection with the beginning of astronomical cycles, the most common occasion being the commencement of the annual cycle of the Sun, at the Rising of Spica. The date given, 4th day of the 12th month, shows that it is not the Sun's cycle that is here referred to, for the 4th day of the 12th month, which was then Tekhi, did not coincide either with the Rising of Spica (or Sirius) during the whole of Ramses II.'s reign. The natural inference, therefore, is that the reference is to the cycle of Set (Mars). Once in every 15 or 17 years it rises heliacally about the same month of the year. More rarely would it rise exactly on the 4th of the 12th month. In 1392 B.C. the 4th of the 12th month was equivalent to 11th August (Julian) and computation of the Rising of Mars with a margin of error of more than 6 days yields the date 16th August, also its nearest Rising to Spica in 15 years.

The 400th year probably does not date from the first year of Nubti but from the Era of Nubti. Now the only

great Eras known apart from the Eras of the Sothiac Cycle itself are those dating from the great conjunction of Jupiter and Saturn near Spica (occurring once in 119 years). One such conjunction[9] occurred in 1793 B.C. when Jupiter rose about 19th August and Saturn about 16th August. If the first year of the Era was not the year of conjunction itself but the first year after the conjunction 1792-91 (when Jupiter rose almost on the day of Rising of Spica, but not so near conjunction with Saturn) this tallies with Ramses' stela.

The chance of a year being found in Ramses II.'s reign, in which the cycle of Mars began, which was at the same time 400 years from a conjunction Era is more remote than $\frac{66}{15 \times 59}$ and therefore the probability that 1392 is the year of the stela and that 1793 fell in the reign of Opehtiset Nubti is greater than .92. The probability is, however, very greatly increased by the circumstance that the conjunction of 1793 was the first great conjunction in the 900 year cycle which was within a month of the Rising of Spica.

It is possible that Manetho's figure of 1050 after the Thirtieth Dynasty does not refer to the period from the end of his Second Tomos but from this year 400, for the interval from 1392 to the end of the Thirtieth Dynasty (342 B.C.) is exactly 1050 years: but there is some doubt whether his figure is meant to be after the Thirtieth or Thirty-first Dynasty.

NOTE 36. CRETAN CHRONOLOGY.

There has apparently been a sufficient quantity of pottery and other objects discovered in Crete to enable archæologists to fix the sequence of the pottery styles with a fair degree of accuracy (though I have not been able to discover exactly what the quantities are, and quantity is very important in estimating the reliability of archæological theories). The stages of Cretan culture after the Neolithic period have been divided into Early Minoan=EM., Middle Minoan=MM., and Late Minoan=LM.

There are two ways of estimating the approximate date to which these periods are to be assigned, (1) by synchronisation with dated civilisations from objects of these civilisations found in Crete or objects of Cretan civilisation found elsewhere, (2) by the relative depths at which the objects are found.

The objects of principal value under the first head are those establishing synchronisms with Egypt. Yet the actual number of Egyptian objects found in Crete up to the most recent survey of the subject is only 71 (PN xi.) and of these a large proportion are not in association with objects which would yield a relative date, while others are obviously in association with objects with which they did not originally synchronise. Thus "several stone vases of the old kingdom have turned up in deposits thousands of years later. Other objects too may have been kept as heirlooms or bought as 'genuine antiques' in Egypt itself" (PN. xvii.).

In no single Cretan site to date have more than 9 Egyptian objects been found with the exception of the

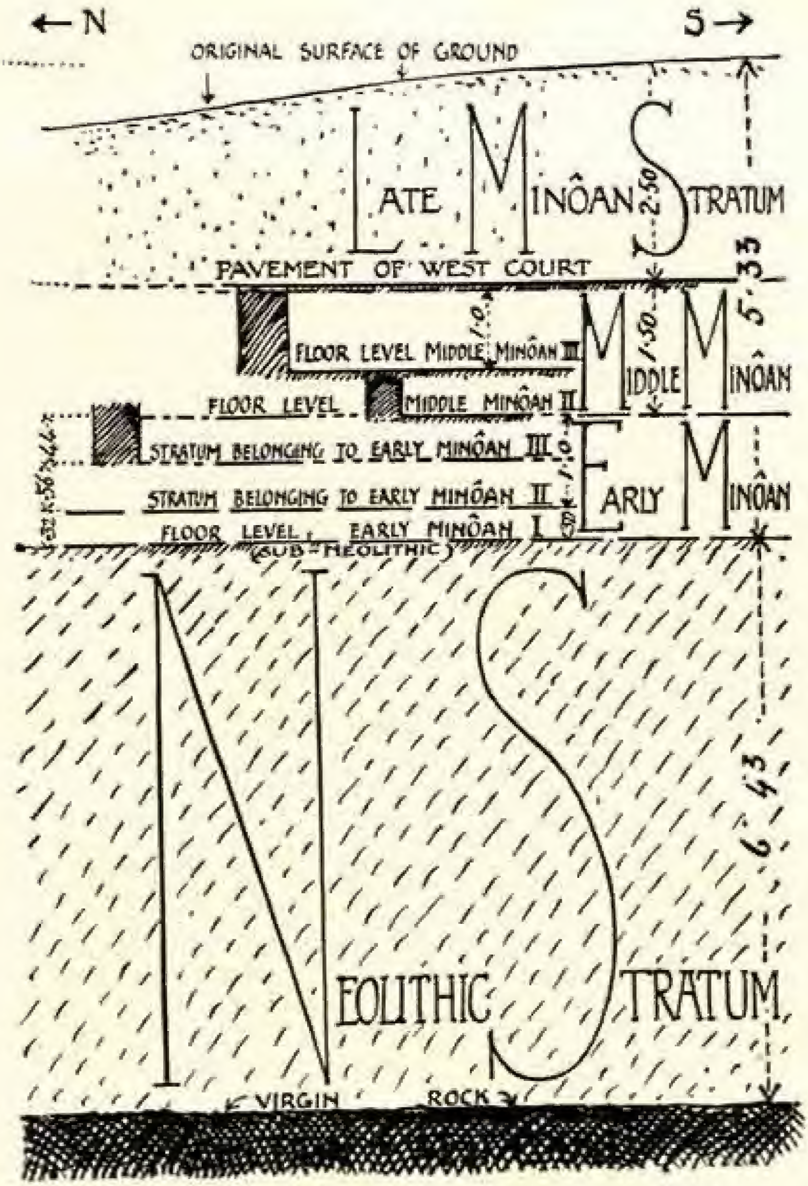

PLATE IX. STRATA NEAR THE PALACE OF KNOSSOS.

Reproduced by the kind permission of Sir Arthur Evans
from the "Palace of Minos."

See Note 36. *(facing page* 194)

Royal Tomb at Isopata containing 16 objects which, however, are useless for dating the Minoan sequences since some belong to the First to Fourth Dynasties and some to the Eighteenth.

Bearing in mind therefore that the whole system of Cretan chronology is based on slight probability only we may provisionally adopt as a rough approximation the generally accepted synchronisation (EB. VI. 679):

Crete	*Egypt*	
EM. I.	Dynasties	I.-III.
EM. II.	,,	IV.-VI.
EM. III.	,,	VII.-XI.
MM. I.	,,	XI.-XII.
MM. II.	,,	XII.-XIII.
MM. III.	,,	XIV.-XVII.
LM. I.	,,	XVIII.-Thothmes III.
LM. II.	,,	XVIII.-Amenophis III.
LM. III.	,,	XVIII.-XX.

The dates assigned to the Cretan periods therefore depend on the dates assigned to the Egyptian Dynasties. Evans assumed that Meyer's 'short' chronology was correct (EP. i. 30) and adapted his Cretan chronology accordingly. (He did not understand* Meyer's theory, however, as is shown by his reference to the Sothis as a 'planet' (EP. i. 290) and his assumption, following Hall, that Nicklin's different date for Senousrit III. is due to a difference in calculation (EP. i. 31) whereas it is due to a difference in theory.)

The only place where any clue of value from depth of soil is published† is on page 33 of Volume I. of Evans'

* "*Quandoquidem dormitat Homerus*" but remains Homer still. Though Sir Arthur Evans accepts Meyer's theory without understanding it and his chronological theories are open to objection this in no way detracts from the brilliance of his pioneer work in the field of Cretan archæology, and the splendid contribution he has made to the study of the handiwork of the craftsmen and artists of ancient times.

† See Plate IX.

Palace of Knossos. There the depths from the present surface of the ground are given as follows:

To Pavement of West Court (end of MM. III. period)	2.50 metres
Floor level MM. III.	3.50 ,,
Floor level MM. II. (MM. I. stratum missing)	4.00 ,,
Bottom of EM. III. stratum	4.44 ,,
Bottom of EM. II. stratum	5.00 ,,
Floor level EM. I.	5.33 ,,
Bottom of Neolithic stratum	11.76 ,,

In a footnote (p. 34) Evans explains that he has abandoned his earlier method of estimating the chronology from the surface distance as unsatisfactory and now bases his chronology on the interval from the end of MM. III., known to correspond with the beginning of the Eighteenth Egyptian Dynasty, back to the beginning of the EM. I. period supposed to correspond approximately with the First Egyptian Dynasty. No reasons for this change of method are given and we are left to suppose that it was in order to make his chronology synchronise with Meyer's. It would seem, however, to be better to proceed from the known to the unknown in the usual manner (as Evans himself did before he heard about Meyer's theory) rather than draw deductions from the hypothetical date of Menes, and disregard the certain date of to-day.

It will be seen that the depth to a period synchronising with the commencement of the Eighteenth Dynasty, 1709 B.C. by my chronology, (*c.* 1580 by Meyer's) was 2.5 metres. To the present time this represents about 3600 (or 3500) years or approximately 1440 (or 1400) years per metre. As the depth to EM. I. was 5.32 metres this yields a date for the beginning of EM. I. about 7660 (or 7448) years before the present time, namely *c.* 5730 B.C., thus differing very little from my date for Menes arrived at independently (*c.* 5776-5714). The fact that MM. I. is missing makes little difference to the average over such a long period.

The dates of (*a*) MM. I. (missing) and MM. II. (of which the stratum extends about half a metre) and (*b*) MM. III. (of which the stratum extends to about 1 metre) might be stated as about 3800 to 3100, and 3100 to 1700 respectively. MM. I. thus may go back a little earlier than the Eleventh Dynasty which began *c*. 3558-3549. A statue of an official User was found (EP. ii. 801) in strata of the later half of MM. II. He is dated to the time of Amenemhat I. by Evers but to early Thirteenth Dynasty by Hall (PA. 22), the deduction of date being apparently made from the nature of the inscription. On the other hand an alabastron of the Hyksos Khyan was associated with deposits of the first part of the MM. III. period (EP. ii. 360). It is clear, therefore, that (if these are not intrusions) the transition from MM. II. to MM. III. took place about 3100 B.C. with a margin of error of about 200 years, thus tallying with the evidence obtained above from the depth. The dates derived from the depths here may therefore be roughly correct. As the Minoan polychrome pottery reached its highest forms in MM. II. and almost entirely disappeared before the close of that period it will be seen that it synchronises in point of time with the period of painted pottery in Babylonia before the Flood (3189), and it may be that it was the inhabitants of pre-Flood Babylonia who supplied either the artificers or the pigments and that the Flood was thus the cause of the sudden diminution in production in both districts, or the Cretans might be the pigment manufacturers and may have been nearly exterminated by one of the many earthquake catastrophes which Evans postulates (EP. ii. 320). (Some valuable evidence might be obtained from systematic chemical analysis of the pigments used in the Cretan, Egyptian, and Babylonian, painted pottery.)

There is, however, later a very definite contact between

the Sumerians and the Cretans, for a bull rhyton (EP. ii. 260) has been found in Babylonia probably of the time of Lugalzagisi (2906-2881) who claimed that he had extended his dominion to the Mediterranean. It is very similar to the bull rhytons found in Crete in MM. II., and almost certainly copied from the Cretan models. Basing his chronology on Meyer's low dates Evans is forced to assume that the Babylonian bull rhyton was earlier than the earliest Cretan rhytons and that the Cretans copied it. This is most improbable for the bull rhytons are found in Crete persisting over a long period from MM. I. to LM. I. while in Babylonia none has been found belonging to any period other than this one. It is surely inconceivable that they were indigenous in Babylonia and imported to Crete instead of *vice versa*, especially as they were "intimately connected with the Minoan central cult." (EP. ii. 264.)

That a date *circa* 2400 B.C. is likely to have fallen within the MM. III. period and not in an earlier phase of Minoan development is shown by the discovery of a Cappadocian cylinder of about that date depicting an incident in bull-grappling sports (EP. i. 15, note 3). Though there is no reliable evidence in Crete of such sports earlier than the MM. III. period Evans is forced from the Cappadocian cylinder to assume that these sports were practised "earlier than the beginning of the MM. I. period" (EP. i. 190) owing to his adoption of Meyer's Egyptian chronology. The remains of painted reliefs in the East Hall of Knossos are supposed by Evans to have been bull-grappling scenes (EP. i. 376) and referred to the close of the MM. II. period (EP. iii. 189). Both the content of the relief and the period to which it is to be referred rest on slight evidence.

Illustrations of bull-grappling sports reach their acme in LM. I. (EP. iii. 177).

Another interesting piece of evidence is the wingless sphinx with a hollow for an inkwell discovered by the Italian mission at Hagia Triada (EP. iii. 421) shown by Dr. A. Seta to have points of similarity with three Chaldæan objects (EP. iii. 422) of which one, a crouched steatite dog with an inkwell set in its back, bears the name of King Sumuilum of Larsa who is dated by Langdon to 2170-2142 and by myself to 2478-2449 (MB. 103). A steatite sphinx from Tylissos is regarded by Evans as similar in style and dimensions to that from Hagia Triada and of contemporary fabric (EP. iii. 425). With it was a small female figurine belonging to the advanced phase of MM. III. (EP. iii. 427). On my chronology the second half of MM. III. was from about 2400 to 1700 B.C. so that the Chaldæan object might be contemporary or nearly so with the Cretan objects. If Meyer's chronology is adopted for Egypt MM. III.b. has to be crowded into the period 1700 to 1600 B.C., which makes it impossible for the Cretan inkstands to be contemporary with those from Chaldæa.

All such evidence is slight, but such as it is it tends to confirm the accuracy of Manetho.

There is, however, one piece of evidence (EP. i. 197-8) which may legitimately be regarded as possibly favouring the short chronology, " the discovery of a cylinder of the First Babylonian Dynasty in association with Cretan scarabs imitating early Twelfth Dynasty types " (EP. i. 31). But this is at present a solitary find, for it is not legitimate to include the other hamatite cylinder of the First Babylonian Dynasty which is not among accurately dated remains (EP. ii. 266). Evans regards the first-mentioned cylinder discovered by Dr. Xanthudides as belonging to MM. I.a. (EP. i. 198). If there was no contradictory chronological evidence such evidence might be provisionally accepted, but it is slight and easily counterbalanced.

In the first place it is to be noted that the method of excavation adopted was to keep specimens from successive ½-metre levels separate (EP. i. 35) and then examine them, and, since half a metre might represent a period of 700 years, even if the cylinder was regarded as in its true chronological surroundings there is a margin of error of this amount.

But to assume that a solitary find is certainly (instead of merely possibly) in association with other objects of its own period is to attach too much importance to this type of evidence. It was possible to find different period work mixed (EP. i. 321) and for intrusions to mislead the excavator (EP. i. 234). Therefore there is no inherent impossibility that the Babylonian cylinder seal was in a stratum to which it did not chronologically belong. The fragility of all evidence based on layers (in Greek and Cretan excavation) is well demonstrated by Pendlebury, who shows that Egyptian objects from the Hagios Onuphrios Deposit belong to the Twelfth or even Eighteenth Dynasty though the deposit is usually regarded as Early Minoan (PN. 6-7) and that First Intermediate and Middle Kingdom objects are alone represented in the Tholos tombs of Messara whose first use should go well back into the Early Minoan Age.

Evans himself says "the succession of deposits in individual cases presents lacunæ which have to be filled up from data supplied by other sections. Only, moreover, by considerable experience has it been possible to guard against certain subtle causes of error such as for instance the total removal of a floor belonging to one construction and its substitution by another on the same level" (EP. i. 28).

Again, in the theatral area of the Palace "Above the 'Kouskouras' lay a deposit 1.52 metres thick. The sherds and other fragments found in this were much mixed

including Upper Neolithic and Early Minoan" (EP. iii. 248). Then there is the extraordinary example of a cylinder built well with Minoan signs North-West of the Palace (EP. iii. 255) under the basement of a house belonging to the earliest MM. III. phase. "It was not unnatural to see in the Melian analogy and the character of some of the incised signs a strong presumption in favour of the Minoan origin of the cylinder built well at Knossos. But the evidence of the objects found in the interior of the well itself imposed great caution in accepting such a conclusion. These proved to be exclusively of a classical character" (EP. iii. 258) but the filling material between the exterior of the cylinders and the natural face of the cutting around them contained sherds which were all Early Minoan. Beyond this rubble filling were rings of stones with heavy lumps of clay set between them in which were found fragments of glass of not earlier than Roman or Hellenistic times.

Such being the case we are obviously safer to depend on the written records of Egypt and the evidence of astronomy for chronological purposes rather than synchronisms with Crete even though they with one exception favour the "long" chronology rather than the "short" chronology.

NOTE 37. THE EBERS CALENDAR.

The Egyptologist Ebers discovered a papyrus dated on the reverse the 9th of the 11th month in the 9th year of a king whose name he identified in 1873 as Zeserkare (Amenhotep I. of the Eighteenth Dynasty). Though the reading has been contested several times (WC. 13) it now has received general assent.

The script continues in the form of a calendar thus (WC. 113):

New Year's Day	month 11, day 9	Rising of Sothis
Tekhi	month 12, day 9	
Menkhet	month 1, day 9	
Hathor	month 2, day 9	
Kaherka	month 3, day 9	
Shefbedet	month 4, day 9	
Rekeh	month 5, day 9	
Rekeh	month 6, day 9	
Renenouti	month 7, day 9	
Khonsou	month 8, day 9	
Khent Khat	month 9, day 9	
Epet	month 10, day 9	

The calendar thus explicitly states that Menkhet was then the first month. We have seen[83] that prior to 2035 B.C. Hathor was the first month and Ptolemy's records of eclipses[82] make it plain that by 721 B.C. Thoth had become the first month, and it probably was so at least as early as 851 B.C.

In the late calendar of Esneh[66] two New Years were celebrated, one at the Rising of Sirius and the other, the New Year of the Ancients, at the Rising of Spica. As Thoth was not in the Ebers Calendar the first month of the Wandering Calendar it would not be the first month of the Fixed Calendar at that period and it is probable that the old New Year, the Rising of Spica, was still celebrated even though the preceding fixed month Menkhet was now

regarded[92] as the first month. Calculation* shows that Spica rose on the 9th of Re Hor Khouti the 11th month (then equivalent to 20th September) about 1676-4 B.C. It is probable that the calendar was drawn up because the year was in some way significant. Now it was not the beginning of a cycle of Sothis or a half cycle or even the coincidence of the 1st of a month with the Rising of Sothis, so we must look elsewhere for a calendrical event of importance. We have seen how in other cases[9] importance was attached to the great conjunctions of Jupiter and Saturn. Calculation shows that one of these fell in 1674 B.C. and Zeserkare would thus commemorate this Feast of Zet by a calendar prepared beginning with the day of Rising of Spica 20th September 1674 B.C., when Jupiter and Saturn were nearer conjunction at Spica's Rising than they would be again for at least 60 years, Jupiter and Saturn both having risen about 2nd September. We may therefore provisionally assign 1674-3 as Zeserkare's ninth year and 1682-1 as his first though his actual accession might take place within the year previous to September 1682. This tallies closely with Manetho's date for Amenhotep I. and we may therefore place his first year as 1682-1.

9th Re Hor Khouti did not tally with the Rising of Sirius (14th July in South, 19th July in North) till about 1424-1404 B.C., which is incompatible with any system of chronology so far proposed. Consequently those who consider that "Rising of Sothis" is incapable of meaning anything else than the Rising of Sirius have felt compelled to postulate that though Menkhet is called the first month the calendar meant Thoth and thus that the eleventh month was Epet though the calendar distinctly calls the

* The chance of the date yielded by the calendar tallying with the date given by Manetho within, say, 10 years is $\frac{20}{1460}=\frac{1}{73}$. There is a probability in favour of this date of roughly $\frac{72}{73}=.98$.

tenth month Epet. This yielded a date in the 16th century which seemed to them satisfactory.

The best argument to get out of the supposed difficulty was that of Sethe followed by Weill, but one notes that this conclusion was only reached after difficulty and that there was a feeling that a more simple explanation would be preferable. " L'explication sans doute assez difficile, comme nous allons voir, n'a été complètement obtenu qu'en 1920. Pendant les cinquante ans qui précédèrent, les innombrables interprétateurs du document se virent comme au pied d'un mur infranchissable, hors l'enceinte d'une insoluble énigme que posait l'apparent déplacement des noms des mois de l'année dans le texte de la première colonne " (WC. 113).

. . . . .

Sethe's explanation of the theory that the 11th month was Epet though the 10th was given that name in the calendar was that the month names here are the names of feasts occurring in the fixed calendar and therefore that the calendar means that the feast of Epet (the 12th by position) culminated on the 1st day of the 12th month of the fixed calendar which happened to coincide with the 9th day of the 10th month of the Wandering Calendar, the feast being according to his view celebrated at the end of the month of the fixed calendar bearing its name and lasting into the following month.

Gardiner followed by Meyer thought on the other hand that there was a backward shift of the feasts later than the Ebers Calendar.

. . . . .

But the symbol used for the Rising of Sothis in the Ebers Calendar is the horns of the Hathor cow. In the Athribis[*] *Zodiac* (A) this symbol by its position cannot possibly refer to Sirius.

NOTE 38. THE SED FESTIVALS.

What is known as the Sed Feast appears to have been celebrated from the earliest times. On a mace of Normer the king is shown in Sed Feast dress (PE. I. 10). There is also a tablet of Den Setui showing the Sed festival: and the Feast of the god Sed is recorded in the reign of one of the kings on the Palermo Stone.

There are two ways of ascertaining the significance of this feast: (1) the descriptions of the ceremonial connected with it, (2) the dates of occurrence.

There are many descriptions, all of which imply that the king is regarded as renewing his life on these occasions. The most significant example is a Sed Feast of Seti I. in which he is addressed as follows: "Thou art renewed and thou beginnest again, thou becomest young like the infant Moon God: thou growest up again (like) him from season to season like Nun at the beginning of his time: (thou renewest) thy births by repeating the Sed-feast. All life is in thy nostrils for thou art the king of the whole earth, for ever." (MN. 129.)

This at once raises a presumption that the Sed Feast is connected with the cycle of the moon.

As regards dates of occurrence more cases are known from the Eighteenth and Nineteenth Dynasties than from other dynasties. They are as follows:

King	*Regnal Year*	*Calendar Date*
Thothmes I.	—	14th of 11th month (Re Hor Khouti)
Hatshepsut	16	21st of 11th month
Thothmes III.	—	28th of 11th month
Amenhotep II.	—	7th of 12th month
do.	—	14th of 12th month
Amenhotep III.	30, 36	—
Rameses II.	30, etc.	—
Merenptah	2	29th of 1st month

The fact that these dates fall regularly later and later suggests that they are dates depending on the rising of a star and are quoted in terms of the Wandering Calendar. The most likely star is the Sothis and this is confirmed by the fact[27] that in the 9th year of Amenhotep I. the Sothis rose on the 9th of the 11th month Re Hor Khouti. By the progression of the Calendar it would rise on the 14th of the 11th month in four years of the reign of Thothmes I. Further confirmation is afforded by the tablet at El Berseh (P. III. 31) dated the 2nd day of the 12th month in the 33rd year of Thothmes III. in which the beginning of a million Sothic cycles was wished for the king.

It will be observed that the interval between known dates is in several instances 7 days. If the date is the exact date of Rising of the Sothis this change in the calendar would take place on the average in 28 years but the interval represented might be as little as 25 years or as great as 31 years. Now 334 lunar months equal 27 stellar years and 371 lunar months equal 29.99 years, so that after 27 or 30 stellar years the New Moons fall very close to their position at the beginning of the cycle. This seems to confirm the hypothesis that the Feast was held when the Festival of New Moon fell very close to the date of Rising of Spica especially as some inscriptions refer to the Festival as the " Festival of 30 years."

But after an interval of only 3 years it might sometimes happen that a Sed Festival was held for 37 lunar months equal 2.99 years.

On this hypothesis it follows that the 1st of a lunar month must have fallen on the 14th of 11th month near the date of Rising of Spica in the reign of Thothmes I. This occurred in September 1662 which must therefore have fallen in the reign of Thothmes I. Similarly the Sed

Festival of Hatsheput's 16th year can be shown to have occurred in 1635; the festival of Thothmes III. can be dated to 1605; and those of Amenhotep II. to 1567 and 1540 (MB. 168ff.).

The Sed Festival in the second year of Merenptah might be in 1331 when Spica rose on 23rd September the 28th of the first month and the astronomical New Moon was on 21st September becoming visible one or two days later: so that he probably commenced to reign in 1332 though Manetho correctly disregards the period of coregency.

. . . . .

Amenhotep III. and Rameses II. each held their first Sed Festivals in their 30th year, and repeated them at short intervals. This is obviously a festival of a different kind. One of the festivals of Ramses was dated in the fifth month and could thus have no reference to the Rising of the Sothis.

It seems probable therefore that their festivals were purely symbolical and that just as the Moon after 30 years has returned to nearly the same place in the sky relatively to the Sun and stars (and Saturn) and renews its cycle, so the king after 30 years on the throne took a new lease of life, and thereafter frequently celebrated the anniversary of his coronation.

There is no record of any king other than these two celebrating a Sed Festival in the 30th year. Senousrit I. celebrated a Sed Festival in his 31st year, but as in that year the New Moon coincided with the Rising of Spica it was probably the true Sed which he celebrated. There is also a series of accounts[26] for festival offerings for the 30th to 31st year of a king near the time of Senousrit III. It may be that even then importance was attached to the

completion of 30 years, but the preservation of this particular statement may be pure coincidence.

. . . . .

We may therefore accept as probable that the normal occasion of the Sed Festival was the coincidence of the visible New Moon with the Rising of Spica.

The following are examples from other dynasties :

Dynasty	*King's Regnal Year*		*Recorded Date*	*Julian Equivalent*	*Rising of Spica*	*Visible New Moon*
Second	Benoteren ?		—	5548 B.C.	25th Aug.	24th Aug.
Second	Benoteren ?		—	5540	25th Aug.	26th Aug.
Sixth	Pepi I.		27th of 11th month		31st Aug.	—
Twelfth	Senousrit I.	31	—	3343 B.C.	7th Sept.	8th Sept.
Twentieth	Ramses III.	29	—	1201 B.C.	24th Sept.	25th Sept.

It is to be noted, however, that though the date given in the reign of Pepi I. was near the date of Rising of Spica and thus might refer to a Sed Festival, Pepi is shown before Min (Jupiter) and it may be that this was really a Zet Festival[9] at the Rising of Jupiter and Saturn in conjunction.

This possibility is further borne out by the inscription of a Sed Festival in the reign of Nebtauira[24] of the Eleventh Dynasty. In that case the calendar date precludes all possibility of the reference being to a date near the Rising of Spica, but, as in Pepi's case, Min is evidently being worshipped and the date tallies for the Rising of Jupiter and Saturn in conjunction. The two terms Zet and Sed though describing different Festivals may therefore be phonetically closely similar.

In Ptolemaic times there is reference to Thirty Year Feasts on occasions of the cycle and half cycle of Saturn.

Note 39. THE EIGHTEENTH DYNASTY.

For the Eighteenth Dynasty we have the versions of Africanus, Eusebius, Josephus and the Sothis book. The lengths of reign given by Josephus for each king to Rameses I. are in every case supported by at least one of the other three (though in the case of Achencherres and Rathos it is only the Canon of Eusebius in Syncellus that supports him).

In my chronology for the Dynasty I adopt Josephus' figures in every case except that the astronomical evidence shows that ten years is missing between the first year of Misfragmouthosis and the first year of Amenophis II. (I therefore assign 35 y. 10 to Misfragmouthosis instead of 25 y. 10.)

Monumental evidence shows also that Chebron and Amenophis I. require to be transposed, while the astronomical evidence suggests that Rameses I. and Horemheb should be transposed. The total brought out for the Dynasty is 259 years, which is exactly the total brought out by adding Africanus' figures though his figures for individuals sometimes differ.

Josephus not only gives the years but also mentions odd months. Thus Thothmes II.'s reign is stated as 12 years 9 months denoting not necessarily his full reign, but his reign up to the time of appointment of his successor Thothmes III. as coregent. Now Thothmes III.'s coronation is definitely known to have been on the 4th of the 9th month so that though the kings themselves usually reckoned their regnal years from the date of accession for chronological purposes it was found convenient to reckon

from the commencement of the Wandering Year in each case, the odd months denoting as Weigall suggested an approximation to the period in the calendar year when the new king succeeded. Thus also the coronation date of Thothmes I. was the 21st day of the 7th month (BR. II. § 60) (which in 1662 was equivalent to 1st June) and Manetho gives the reign of his predecessor as 20 years 7 months.

It will be noted that Chebron's reign is stated as 13 years exactly, indicating that Manetho thought his successor Hatshepsut was crowned about New Year's Day of the Wandering Calendar. His error may be excused for inscriptions show that she was crowned exactly on New Year's Day, but it was not the New Year's Day of the Wandering Calendar but of the Year of the Ancients at the Rising of Spica on 20th or 21st September. Thus her obelisk inscription (BR. II. § 318) records: " My majesty exacted work thereon from the year 15 the first of the sixth month until the year 16 the last of the twelfth month making seven months of exaction in the mountain." Thus year 15 ended and year 16 began between the 1st of the 6th month and the 30th of the 12th month. So the New Year's Day of her coronation was not the New Year's Day of the Wandering Calendar. That it refers to the Rising of Spica is confirmed by Naville's translation of the description of one anniversary record (BR. II. § 233), "at the festival day of her coronation when the first day of the year and the beginning of the seasons should be united." The " Beginning of the Seasons " in all other cases refers to the great conjunction of Jupiter and Saturn near Spica, and this must be a reference to the anniversary of her coronation in 1614 when the Rising of Jupiter and Saturn took place near Spica (just 1 year and 3 months after Thothmes III. had been crowned).

We may therefore accept Manetho's figures as a guide to the approximate date of coronation in each case. It is to be remembered however that dates might also sometimes be quoted in terms of the sacred calendar, and if Manetho's figures are correct this seems to have been so in the case of the date of coronation of Thothmes II. and Amenhotep III. The former was crowned on the 8th day of the 2nd month (BR. II. § 120) about 30th July in the Sacred calendar, and the latter on the 2nd day of the 3rd month equivalent to about 23rd August.

. . . . .

Manetho's figures for the Eighteenth Dynasty have many astronomical checks. Thus the date of the ninth year of Amenhotep I. is fixed by the Ebers Calendar[37] as approximately September 1674-1673 reckoned from the first Rising of Spica after his accession namely in September 1682. The astronomical ceiling[38] in the Tomb of Senmut inscribed in Hatshepsut's reign earlier than the accession of Thothmes III. shows the Rising of the Sothis in Re Hor Khouti, approximately confirming the epoch of the Eighteenth Dynasty, while records of Sed Festivals[39] show that 1662 fell in the reign of Thothmes I., that Hatshepsut's 16th year began in September 1635, that 1605 fell in the reign of Thothmes III., and that 1567 and 1540 both fell in the reign of Amenophis II.

. . . . .

Having thus in all probability a reliable guide in Manetho, we may examine some other festivals of astronomical significance.

There is a stela of great interest which was acquired by Petrie (AE. 1921. 15) bearing the following inscription: "(In the year ?) 4th month of Summer 17th day of His Majesty the King of Upper and Lower Egypt Nebpehtetre, son of Re, Ahmose given life (he built) anew this wall as

his monument to his father Montu, Lord of Thebes, the Bull in the midst of Hermonthis." Owing to the fact that the Dowager "Royal Mother Tetisheri" is shown standing behind Ahmose it has been concluded that the stela belongs to an early part of his reign.

Now dedications to a god were usually made at the rising of the god, and we may thus frame the hypothesis that the 17th day of the 12th month corresponded with the Rising of Montu. His identity as one of the gods of Saturn seems probable from the list of gods who came to Hatshepsut on her journey north (BR. II. § 224), Hathor, Buto, Amon, Atum, Montu, Khnum. Amon is Jupiter, Atum the Sun, Khnum Mars, Hathor Spica (and its ruler Venus). Buto and Montu alone are not clearly fixed and one of them must be a god of Saturn as it would surely not be omitted. Now in one of the Athribis horoscopes the planet Saturn is represented by a bull-headed bird so we may provisionally identify Saturn with Montu. Buto may be Sirius, just as the Buto man (Boethus of Manetho's list) was called Sirius by Eratosthenes.

If we regard it as certain that the date in question must fall in the first 15 years of Amosis' reign, the chance of a calculated date of Saturn's rising being found to tally with the 17th of the 12th month in that period within 2 days is $\frac{4 \cdot 15}{365} = 1$ in 6.08. Saturn rose about 1st November 1698 and in that year the 17th of the 12th month was equivalent to 3rd November. 1698 fell within the first 15 years of the reign. There is therefore a possibility (.16) that Montu is to be regarded as Saturn and similarly a slight confirmation of the approximate date of Amosis.

The next interesting date is the date on the Stela of Keres (BR. II. § 51) the 1st of the 9th month of the 10th year of Amenhotep I. This is in the year after the year of the Ebers Calendar (20th September 1674 to 19th September

1673) namely 13th July 1672 B.C., near the date of Rising of Sirius. On the Stela Keres records the command of the king's mother to erect a tomb. The date was well chosen for Sirius ruled rebirth and life after death.

In year 2, 2nd month of the 3rd season (10th month) day 7, Thothmes III. was making preparations for the "Festival of the Beginning of the Seasons" (BR. II. § 169 ff.) the conjunction[9] of Jupiter and Saturn near Spica which occurred in September 1614 when Jupiter rose about 23rd September (the 27th of the 11th month) a few days after the Rising of Spica (the anniversary of Hatshepsut's coronation) Saturn having already risen on 15th September. This was probably the occasion when the inscriptions were added on the side columns of Hatshepsut's obelisk. A previous occasion (2 major cycles back) when Jupiter and Saturn rose in conjunction so near Spica was in the 18th year of Senousrit III. on the 21st day of the 8th month when he at the same time celebrated the "Repulse of the Troglodytes." Thothmes III. also ordered the anniversary of that Feast to be celebrated.

In his 15th year on the 27th day of the 9th month Thothmes III. gave orders (BR. II. § 163) "to found a great divine offering anew— . . . in order that the altars of my father Amon may be supplied for all eternity." The date would correspond to 21st July 1601 (shortly after the anniversary of his accession).

At the first great annual Feast of Amon after the Campaign of his twenty-third year Thothmes III. celebrated his victory. As he also founded an offering for the "Going Forth of Min" (both Amon and Min being gods of the planet Jupiter) the reference is to the annual heliacal Rising of Jupiter. The date given is the 14th of the 2nd month. As in the period from the Eighteenth Dynasty onwards dates of sacred festivals were sometimes quoted in

terms of the old Sacred Calendar which had been kept in use by one or more of the colleges of priests, this may be equivalent to approximately 5th August. The year is missing at this point in the inscription and Breasted supplies the year 23 (BR. II. § 554). But as further on the inscription reads (§ 555) " from the year 23 until the recording of this tablet upon this sanctuary " it is far more likely to be the year 24, especially as he had only begun the siege of Megiddo on the 21st of the 9th month (of the Wandering Calendar) in the year 23 equivalent to July 14th and it would manifestly be impossible to complete his campaign and get back to Egypt by 5th August. The assumption that the date is in the 24th year is confirmed by astronomical computation which yields 3rd August 1592 B.C. as an approximate date of Rising of Jupiter.

In year 29 Thothmes sacrificed to Amon and to Harakhte (BR. II. § 458) together which implies that in that year July 1587-July 1586 Jupiter (Amon) was rising at the nearest point of its 12 year cycle to the Winter Solstice (corresponding to the Rising of Cancer 0° of the Constellations on the 1st of the 1st month, Re Hor Khouti, when the sacred calendar originated in the fifteenth millennium). In 1586 the Winter Solstice was about January 3rd (Julian). Computation yields the approximate date 7th January for the Rising of Jupiter thus confirming the date. When Thothmes III. returned after " the first victorious campaign which my father Amon gave to me when he gave to me all the allied countries of Zahi shut up in one city " (BR. II. § 616) he gave commands " to have executed every contract of the court for Mut Hathor mistress of Thebes on the day of the Altar-of-the-Feast which takes place on the last day of the third month of the third season " (BR. II. § 622). Breasted assumes that this was after the first campaign but the astronomical

evidence shows that this view is erroneous. A court for Mut Hathor implies that Mut (Saturn) was rising at its nearest to Hathor (Spica) in its 30 year cycle. The exact date being given, 30th of the 11th month, the year is fixed precisely, for the only occasion when Saturn is calculated to rise near the 30th of the 11th month and at the same time near Spica was on 18th September 1584 B.C. This was in his 32nd year and thus followed the campaign of his 31st year, the first year in which he had great success in Zahi (Phoenicia) which had revolted two years previously. In Ullaza he took 494 captives, including several important captives from other towns who happened to be there (BR. II. § 470).

The London obelisk records (BR. II. § 633) that Thothmes III. made it for Harakhte at the third occurrence of the heb Sed. Brugsch read it as "fourth" but the astronomical evidence shows that Breasted who read it "third" should have trusted his own eyes instead of adopting the reading of Brugsch (*loc. cit.* footnote f.). Harakhte implies that the date was near the time of the Winter Solstice. Sed or Zet Festivals were of three kinds, the lunar Sed Festival at the Rising of Spica coincident with new moon, the festival on the 30th anniversary of the king's coronation, and the ordinary conjunction of Jupiter and Saturn. Spica did not rise near the Winter Solstice, and Thothmes' coronation day was in July, therefore this must refer to the Zet Festival, the conjunction. The first conjunction in Thothmes' reign (and incidentally in the great 900 year cycle) was in his second year September 1614, the second 20 years later, and the third in 1574 B.C., when Saturn rose about 1st January and Jupiter about 12th January, the conjunction rising nearest to the Winter Solstice in his reign (and quite possibly in 900 years). This was therefore in Thothmes' 41st year.

There are two dated festivals[29] of the first of the lunar month in his reign which tally for the dates given if the Babylonian type of month beginning near the date of the visible New Moon was then in use. There is also some interesting seasonal evidence in connection with his Syrian campaigns which is treated elsewhere.[30]

Thothmes IV. in his eighth year (September 1572 to September 1571) was at Karnak getting ready for the annual Feast of Amon when on the 2nd day of the 7th month (20th April) news was brought of a Nubian rebellion. Calculation shows that Jupiter rose in 1571 about 11th May thus confirming the date.

Amenhotep II. in his first or second year (BR. II. § 782 footnote c) fought a battle near the Orontes on the 26th day of the 9th month (12th July) and after the battle sacrificed to Amon before proceeding southward (§ 784). It might, of course, be a sacrifice without reference to the Rising of Amon, but it is far more likely to be at the rising for on no occasion do we find the kings making such a sacrifice in the middle of their campaign when Amon was not rising. Computation (with a margin of error of more than 1 day) yields 11th July as the date of rising in 1569 B.C., which fell in his first year according to the chronology.

In his third year on the 15th of the 11th month (§ 792) he again made oblations to Amon. The date corresponds to 30th August 1567. Calculation shows that Jupiter rose about 9th September (the 25th of the 11th month) in that year (which suggests that if distinct the inscription would show 25th not 15th). There is an oblation scene above the inscription at Amada (§ 791) showing the king offering wine to Harakhte and Amon Re. The reference here is not to the Winter Solstice itself but to the month named after the god of the Winter Solstice, Re Hor Khouti, then

the 11th month of the Wandering Calendar, the month in which Jupiter rose in that year.

The date of Amenophis III. receives an approximate check from the Karnak Clock[49] and Babylonian synchronisms.[72]

Akhenaten on the 13th day of the 8th month in his 6th year (BR. II. § 959) made oblation to Aton. The date corresponds to 12th May (=29th April Gregorian) 1495 reckoning from actual accession, or 1494 reckoning from the first New Year's day following his accession. He was regarded as a heretic by the priests of Ammon and the climax of a dispute between him and them was reached about this year. At the Rising of Spica in September 1495 Jupiter and Saturn had risen in conjunction, an event to which the priests of Ammon (Jupiter) paid great importance, and perhaps Akhenaten had refused to conduct the ceremonies in person as was expected of the king. On the other hand he, like Amenophis III., paid great attention to the worship of Horus[49] (Venus) and Aton (the setting Sun). The special worship of Aton in the 8th month may therefore have been connected with the evening "rising" of Venus which occurred on 5th May 1494 B.C. In 1496 B.C., its evening "rising" had occurred on 28th September nearer to the date of Rising of Spica than it had been for many years though every 8th year following it would rise nearer till about 1472 B.C. occurred the evening rising closest to the New Year's Day of the Fixed Calendar in its cycle of about 235 years.

The date of Ramses I. is checked by a record "Year 2, second month of the second season twentieth day. . . . His Majesty was in the city of Memphis performing the ceremonies of his father, Amon Re, Ptah South of his Wall. . . . His Majesty . . . . commanded to establish divine offerings for his father Min Amon." The

date given is equivalent to 10th March 1454 B.C. Calculation shows that Jupiter (Min-Amon) rose about 10th March in that year.

. . . . .

There are some pieces of direct evidence bearing on the order of the kings in this dynasty. Thus Ahmose son of Ebana served under three successive kings, Ahmose I., Amenhotep I., and Thothmes I. (BR. II. § 1). His biography contains references to the expulsion of the Asiatics in the reign of Ahmose.

The biography of Ineni (BR. II. § 99 ff.) records his service under Amenhotep I., Thothmes I., Thothmes II., and Thothmes III. From it it is apparent that Hatshepsut was not as yet a great force in the time of Thothmes I. and II., though, as Manetho's figures and the astronomical evidence show, she was assumed as coregent after Thothmes I. had reigned 13 years.

Hatshepsut is definitely known to be the daughter of Thothmes I. (BR. II. § 237). She is thus the sister of Thothmes II. and aunt of Thothmes III. If the Hatshepsut of Thothmes III.'s reign is regarded as his sister as has been held then she must be a different Hatshepsut. But apparently this notion arose from a passage in Ineni's biography. After mentioning the death of Thothmes II. (BR. II. § 118) he goes on to say (BR. II. § 341): "His son stood in his place as king of the Two Lands, having become ruler upon the throne of the one who begat him. His sister the Divine Consort, Hatshepsut, settled the affairs of the Two Lands by reason of her plans." Now clearly "His sister" may mean the sister of Thothmes II. rather than the sister of Thothmes III., just as "His son" means the son of Thothmes II., namely Thothmes III. Thothmes II.'s sister would be about 50 years of age when Thothmes III. succeeded to the throne in July 1615 B.C.,

if we assume that she was about 15 at her accession in 1650.

In the inscriptions of Senmut reference is constantly made to the king (unnamed) (BR. II. § 350 ff.), Breasted assumes the reference to be to Thothmes III. It is more probably to Thothmes II., with whom Hatshepsut was previously coregent after her coregency with her father. Similarly in the inscription on the Berlin statue "the death of his predecessor" (BR. II. § 368) probably refers to Thothmes I.

An Abydos stela with reference to the life of Nebwawi (BR. II. § 184) shows that Thothmes III. was still living as coregent with Amenhotep II., and the biography of Amenemhab records his death in his 54th year on the last day of the 7th month (BR. II. § 592) namely 15th May, 1561. According to the astronomical evidence and Manetho the coregency must therefore have lasted about 8 years.

Thothmes IV. inscribed *inter alia* the following lines on an obelisk (BR. II. § 833): "It was his majesty who beautified the single very great obelisk being one which his father, the King of Upper and Lower Egypt, Menkheperre (Thothmes III.) had brought, after his majesty had found this obelisk, it having spent 35 years lying upon its side in the hands of the craftsmen on the south side of Karnak." The natural interpretation to put on this is that his majesty (either Thothmes III. or Thothmes IV.) found it after it had been lying on its side for 35 years. Breasted takes it to mean that his majesty Thothmes IV. found it 35 years after the death of Thothmes III., but there is absolutely nothing to indicate this. There might be many reasons for its being overlooked in Thothmes III.'s life.

In the reign of Ramses II. reference is made to legal proceedings "in the year 59 of Horemheb" (BR. I. § 67).

If Horemheb reigned 60 years this would indicate that he was coregent with Seti I. throughout the greater part of his reign.

There is in the neighbourhood of Memphis a graffito (ME. 155) of the time of the Eighteenth or Nineteenth Dynasty registering the beginning of the rise of the Nile, "The year 10, the 13th of the second month of Summer, that day there was a great rising of the Nile." On my chronology the Eighteenth Dynasty commenced in 1709 when the 13th of the 10th month (Epet, according to the Ebers Calendar) was equivalent to 2nd September (Julian) =18th August (Gregorian), and ended in 1450 when it was equivalent to 30th June (Julian)=17th June (Gregorian). The record is therefore in harmony with a date in the later portion of the Eighteenth Dynasty, perhaps about the 10th year of Amenophis II., or Amenophis III.

On the theory that the Ebers Calendar[37] refers to the Rising of Sirius, that the 10th month was then Payni, and that the Eighteenth Dynasty commenced in 1580, the 13th of the 10th month would at the beginning of the Dynasty fall in the first half of June (Gregorian) and at the end of the Dynasty in the middle of April. Unless the graffito belongs to the Seventeenth Dynasty which is improbable, either a miracle occurred or that chronological theory is impossible on this ground, as it is also on the evidence of the Karnak Clock,[48] and all other available evidence.

PLATE X. ASTRONOMICAL CEILING IN THE TOMB OF SENMUT

Reproduced by the kind permission of the Editor from the "Bulletin of the Metropolitan Museum of Art," New York, February, 1928.

See Note 40. (*facing page* 211)

Note 40. THE ASTRONOMICAL CEILING IN THE SECRET TOMB OF SENMUT.

Mr. H. E. Winlock excavating in 1926-27 for the Metropolitan Museum of Art discovered the tomb of Senmut, who was the high official of Hatshepsut and supervised the erection of the great obelisks of her 16th year. The tomb seems to have been begun before that date (MM. Feb. 1928, p. 42). One of the most interesting features of the tomb is the astronomical ceiling* (MM. Feb. 1928, p. 40).

One half of the ceiling clearly represents the same epoch exactly as the figure in the Ramesseum.[32] The figure in the Ramesseum was formerly said to represent either the horoscope of birth of Rameses II. or the date of building of the Ramesseum. As Senmut lived long before the time of Rameses II. such theories are definitely put out of court. My theory is that it represents the date of a half cycle of Sothis namely that in 2035 B.C., recorded as being an important epoch; and this record of Senmut may be presumed to refer to the same epoch.

The other half of the ceiling shows twelve circles representing the twelve months of the year. Above each of these the name of each month is given except in the case of Re Hor Khouti, where the symbol of the Rising of the Sothis is inscribed just as it was in the Ebers Calendar.[37] But the Ebers Calendar gave the exact date of rising whereas this does not. Therefore all that can be said is that this calendar represents a date earlier than

* See Plate X.

1593 B.C. In that year the Sothis no longer rose in the 11th month but on the 1st of the 12th month (Tekhi).

According to the chronology Hatshepsut reigned *circa* 1650 to 1600 which tallies with the calendar, for the Sothis would rise in the latter half of the 11th month (Re Hor Khouti) at that period. In the arrangement on the ceiling Tekhi is placed first for it was the first complete month after the Rising of the Sothis, the New Year of the Ancients.

Between Kaherka and Shefbedet Horus is shown smiting the Northerner. This scene properly belongs to fixed Shefbedet (the Rising of Sagittarius) but many of the Festivals were transferred to the equivalent month of the Wandering Calendar. Below are shown the genii of the Dead with their attendants.

NOTE 41. THE RISINGS OF THE GODS.

In Egypt the planetary gods had different names in different districts and in many cases were associated with animals or with animal-headed men. The five planetary gods of Abydos, however, seem eventually to have been respected throughout the whole of Egypt, for to each of them was assigned one of the epagomenal days in the 365 day calendar. They were Osiris, Horus, Set, Isis, and Nephthys. I have already given my reasons (MB. 139, 178) for identifying these with Jupiter, Venus, Mars, Mercury, and Saturn respectively, and these identifications seem to me to be confirmed by my examination[89] of the Athribis horoscopes. Certainly Lepsius' identification of Set, the god of evil, as Mercury is erroneous for in *Zodiac* B* (PA.) the long-beaked hawk in Capricornus can hardly be other than Set and it is impossible for Mercury to be in Capricorn when the Sun is in Taurus. Further the colour attributed to Set by the Egyptians was red (BU. I. 58), which is the colour of Mars.

Plutarch (*De Isid.* 8) referred to those who sacrificed a sow† to Typhon (Set) at full moon.‡ Both Plutarch and Aelian describe the ceremony as taking place " once a year." It is more probable that the ceremony was biennial for of the three superior planets Mars is the only one which does not rise heliacally approximately once a year. It would be

* See Plate XVI.

† According to Cato the Elder the Roman farmer sacrificed a pig, a sheep and a bull, to Mars. (FF. III. I.)

‡ Herodotus relates the same thing of Dionysus but he is probably in error. The pig was sacred to Set. (See Newberry in JEA. XIV, p. 213).

felt that Set should have a special annual ceremony like the other gods, but as it only rose heliacally in alternate years the ceremony every second year would be held at the full moon nearest to its opposition to the Sun.

At Thebes Amon (Jupiter) was the principal god and, as in the reign of Seti I. (BR. III. § 136 ff), there is often mention of "Amon Re, Lord of Thebes, Mut, Mistress of Ishru, Khonsu in Thebes, beautiful Rest, Horus, Lord of Joy, and Thoth, Lord of Karnak." Khonsu was the name of the month of the fixed calendar in which the constellation Aries (one of the signs of Mars) was rising, and Thoth the month which began with the Rising of Sirius, the star of Isis (Mercury). Aries was the constellation in which the full moon occurred in the first month of the fixed Civil Calendar which began with the Rising of Spica and Khonsu is often represented wearing the disc of the full moon but it is possible that just as Thoth (called Hermes by the Greeks) was sometimes associated with its star Sirius ("thrice greatest Hermes") and sometimes with its planet Mercury, so Khonsu may sometimes have been associated with Aries and sometimes with Mars. That being so the five gods here mentioned may be the gods of the five planets Jupiter (Amon), Mut (Saturn), Khonsu (Mars), Horus (Venus) and Thoth (Mercury).

Another important god was Min of Coptos. Min at one period was the name of the month later called Shefbedet which corresponded in the fixed calendar to the rising of the stars of Sagittarius, one of the signs of Jupiter. It was in the late period identified with or supplanted by Amon (Jupiter) and it therefore seems probable that it was also a god of the planet Jupiter. This seems to be confirmed by the fact that Min like Osiris (Jupiter) was represented in art as a mummy. A priestess Nesikhensu was (in regard to her fifth office) described (GP.) on one of her coffins as

"Priestess of Osiris, Horus, and Isis in Abydos" while on the other coffin she was called "Priestess of Menu, Horus, and Isis in Aapu." Menu (or Min) and Osiris thus seem identical.

Among other planetary gods were Anubis, Apuat, Sokar, Yamet, Seshat, and Mefdet. All of these except Apuat occur on the Palermo Stone where it is evident that Anubis has an 8 year cycle and therefore must be a god of Venus (the only planet with an 8 year cycle). It is also to be noted that the god of the 17th nome was first Anubis and afterwards Horus (Venus). It seems probable that Apuat is another god of the planet Venus. Thus Naville (FN. 12) states that the prophet of Horus is often connected with Apuat and also refers to "Anubis, called here Apuat." Also Moret (M. 127) shows Thothmes III. "clad in the Osirian winding sheet, and preceded by the ensigns of Apuat and Khonsu," "Seth Nubti and Horus, the ancestral kings, direct his shooting." As Seth (Mars) corresponds to Khonsu, it is probable that Horus (Venus) corresponds to Apuat.* Reference is made to some festivals of Horus in a separate[42] note.

The Feasts of Sokar are discussed in a special note[61] and reference is made to Yamet, Seshat, and Mefdet in my discussion of the Palmero Stone.[5]

From the Eighteenth Dynasty onwards there are quite a number of Feasts referred to which owing to the changes of date in the calendar year must refer to important events in the cycles of the planets, the most usual being the heliacal rising, often specially denoted by adding Ra (the rising Sun) after the name of the planetary god. These are discussed in the notes on the dynasties in which they occur but may be tabulated here for convenience of reference:

* Cf. Also Budge's Comments (B.G.E. i., 493-4).

King's Reign	*Regnal Year*	*Egyptian Date*	*Julian Equiv.*	*Planet*		*Calculated Approximate Date of Phenomena*
Amosis	—	17th of 12th month	3rd Nov.	Montu = Saturn	rising	1st Nov. 1698
Thothmes III.	24	14th of 2nd month (sacred)	5th Aug.	Min = Jupiter	rising	3rd Aug. 1592
Thothmes III.	29	Harakhte (solstice)	c.3rd Jan.	Amon = Jupiter	rising	7th Jan. 1586
Thothmes III.	—	30th of 11th month	Sept.	Mut = Saturn	rising	18th Sept. 1584
Thothmes III.	—	Harakhte (solstice)	c.3rd Jan.	Zet = Jupiter and Saturn	rising	12th Jan. 1574 1st Jan. 1574
Thothmes IV.	8	2nd of 7th month	20th April	Amon = Jupiter	rising	11th May 1571
Amenhotep II.	1	26th of 9th month	12th July	Amon = Jupiter	rising	11th July 1569
Amenhotep II.	3	15th of 11th month	30th Aug.	Amon = Jupiter	rising	9th Sept. 1567
Ramses I.	2	20th of 6th month	10th March	Min-Amon = Jupiter	rising	10th March 1454
Ramses II.	1	23rd of 3rd month (sacred)	13th Sept.	Amon = Jupiter	in opposition	5th Oct. 1394
Ramses II.	3	4th of 5th month	12th Jan.	Horus = Venus Min = Jupiter	in conjunction	12th Jan. 1391
Ramses III.	—	22nd of 1st month (sacred)	17th July	Osiris = Jupiter	rising	14th July 1225
Ramses III.	16	10th month	May	Amon = Jupiter	rising	17th May 1215
Ramses IV.	2	—	—	Amon = Jupiter Mut = Saturn Isis = Mercury	rising	22nd Oct. 1198 26th Oct. 1198 27th Oct. 1198
Ramses IX.	10	19th of 3rd month	2nd Oct.	Amon = Jupiter	rising	4th Oct. 1163
Ramses XI.	27	8th of 12th month	2nd June	Osiris = Jupiter	rising	1st June 1096
Paynozem I.	25	29th of 11th month (sacred)	21st May	Amon = Jupiter	rising	20th May 1037
Paynozem I.	26	4th epag. day (sacred)	25th June	Amon = Jupiter	rising	23rd June 1036
Paynozem the priest	—	—	—	Amon = Jupiter Mut = Saturn Khonsu = Aries	rising	4th April 979 1st April 979 April 979

King's Reign	*Regnal Year*	*Egyptian Date*	*Julian Equiv.*	*Planet*		*Calculated Approximate Date of Phenomena*
Sheshonk I.	21	10th month (sacred)	Mar.-April	Amon = Jupiter	rising	c.25th March 920
				— = Saturn	rising	c.30th March 920
Osorkon I.	—	—	—	Herishef = Mercury	evening rising	18th July 906
				Thoth = Sirius	rising	19th July 906
Osorkon I.	—	—	—	Hathor = Spica	rising	25th Sept. 906
				Mut = Saturn	rising	1st Oct. 906
Osorkon I.	—	—	—	Thoth = Sirius	rising	19th July 905
				Bast = Mars	rising	20th July 905
Osorkon II.	22	1st of 4th month (sacred)	c.25th Sept.	Amon = Jupiter	rising	20th Sept. 867
Sheshonk III.	25	—	—	Amon = Jupiter	rising	19th April 860
				Mut = Saturn	rising	17th April 860
Sheshonk III.	29	—	—	Amon = Jupiter	rising	23rd Sept. 855
				Hathor = Spica	rising	25th Sept. 855
Sheshonk III.	39	26th of *x* month (? 12th sacred)	(c.19th June)	Amon = Jupiter	rising	30th June 846
Sheshonk IV.	22	—	—	Anubis = Venus	rising	20th Sept. 819
				Osiris = Jupiter	rising	7th Oct. 819
				Hathor = Spica	rising	26th Sept. 819
Taharka	—	28th of 10th month	29th Nov.	Min-Amon = Jupiter	rising	1st Dec. 663
Psammetichus I.	9	14th of 2nd month (sacred)	c.5th Aug.	Amon = Jupiter	rising	6th Aug. 655

In the majority of cases the date is stated in terms of the Wandering Calendar but sometimes in terms of the old Sacred Calendar.

The great Festivals of the Beginning of the Seasons are excluded from this list being tabulated and discussed in a separate note.[9]

NOTE 42. HORUS FESTIVALS.

There is little doubt that Horus (Apollo) was the bright planet which remains close to the Sun namely Venus.* It has a cycle of 8 years. In each successive cycle its risings occur in the same sequence on almost exactly the same days of the Egyptian Wandering Year (2 days earlier in the Julian year) over a long period. It thus formed a convenient cycle for measuring short periods of time and was subdivided into 4 periods of 2 years each, Horus Festivals being recorded in alternate years on the Palermo Stone.

Just as risings of other planets near Spica were considered of special importance the same appears to have been the case with Horus. Very few recorded instances have been preserved. There is a record, however, of the erecting of a building to Horus-Ra by Senousrit I. in his Third Year (BB. XI. 14). The building was thus in honour of the Rising of Venus (Horus) with the morning Sun (Ra). It did so rise on 6th October 3371 B.C. This was not only the nearest rising to Spica in its 8 year cycle but the first (or possibly second) occasion when it had risen within 30 days of Spica at the commencement of a new great cycle of morning risings of Horus of 240 years during which they would occur within 30 days of Spica's rising. The most important rising in that cycle would be that about 3251 B.C., but no record has come down.

In the Eighteenth Dynasty[39] we find some of the kings paying attention to the worship of Horus, especially

* Lepsius regarded it as Mars.

Akhenaten. He was worshipping[39] Aten (the setting Sun) on the 13th day of the 8th month (12th May) in his 6th year (1495 or 1494) and this may have been because Horus (Venus) was setting with it, its evening "rising" having newly occurred on 5th May, 1494.

In Greek times we find Ptolemy III. laying the foundation of a temple to Horus on a date which is probably to be equated with 23rd August 237 B.C., the exact date of morning rising of Venus in that year.

The birth of Horus was celebrated on the 21st of the 8th month in the Calendar of Edfu (WC. 161). In 120 B.C. this corresponded with 11th May, the date of morning rising of Venus and it rose about the 21st of the 8th month every 8th year for some time. (Some texts give 28th Pharmouthi as the date.)

In later times the word Horus may have come to be used with the wider meaning simply of planet or Sun, qualified by special adjectives.

PLATE XI. THE KARNAK WATER CLOCK.

Reproduced from "Ancient Egypt."

See Note 43. (*facing page* 221)

NOTE 43. THE KARNAK CLOCK.
(*cf.* AE. 1924. 43ff.)

An alabaster clepsydra was found in 1904 at Karnak, broken in many pieces, and was reconstructed* for the Cairo Museum. It is known to belong to the reign of Amenophis III. and is the oldest specimen of waterclock in existence.

Part of the upper register is occupied with representations of the planets, and of the constellations heliacally rising each month at the great epoch of the Half-Cycle of Sothis as in the zodiac in the Ramesseum[82] (LD. 3. 170-171) and at Medinet Habu (Daressy MH., p. 155 *seq.*).

Around the rim inside appear the numbers of the calendar months in order, "first month of first season," etc. Under each month sign are marks at intervals† to show how much lower the water level is at each hour for the month in question. The clock is an outflow clock and the aperture through which the water dropped is between the 12th and 1st months. The clock shows only 12 hours. At the end of the twelfth hour in the 9th and 10th months the water had not dropped so low as at other periods of the year, while in the 3rd and 4th months it had dropped lower. If the marks for each month represent the first of each month the top of the curve would be about the end of the 9th month. If the marks represent the middle of each month the top of the curve would be in the beginning of the 10th month. This variation is obviously due to the

* See Plate XI.

† See Plate XIa.

variation in the lengths of night and day at the various seasons. The probability is that the clock is a night clock* for the hours of the day can readily be measured by the sundial whereas in the absence of a water clock the hours of night can only be measured by the complicated method of (1) Calculating the angle of a star or stars or (2) noting the meridian passage of a number of stars and comparing with a carefully adjusted daily table of times or (3) noting the rising or setting of a number of stars. The Egyptian hour of night was probably a twelfth of the interval from sunset to sunrise, not a twenty-fourth part of the mean length of day and night combined.

If it is a night clock it follows that the water level would fall least at the Summer Solstice. In my chronology Amenophis III. reigned from about 1538 to 1501 and on my Sothiac theory the 29th of the 9th month and intervening days to the 8th of the 10th month (then Epiphi) were at different portions of his reign equivalent to 7th July (Julian) the approximate date of the Summer Solstice, thus tallying closely with the evidence of the clock. According to Meyer, Amenophis III. reigned about 120 years later, while on his calendrical theory Payni was then the 10th month and 1st Payni corresponded to the end of April or beginning of May so that the clock showed the Summer Solstice at that period of the year, though in reality it was in the beginning of July (Julian)!

* * * * *

In order to try to harmonize the evidence of the clock with Meyer's theory R. W. Sloley, following Petrie, suggested (AE. 1924) (1) that at a high temperature the viscosity of the water would be such that it would flow quicker and (2) the mass of the building in which the

* Water clocks for use in the day time are, however, known from Greek times.

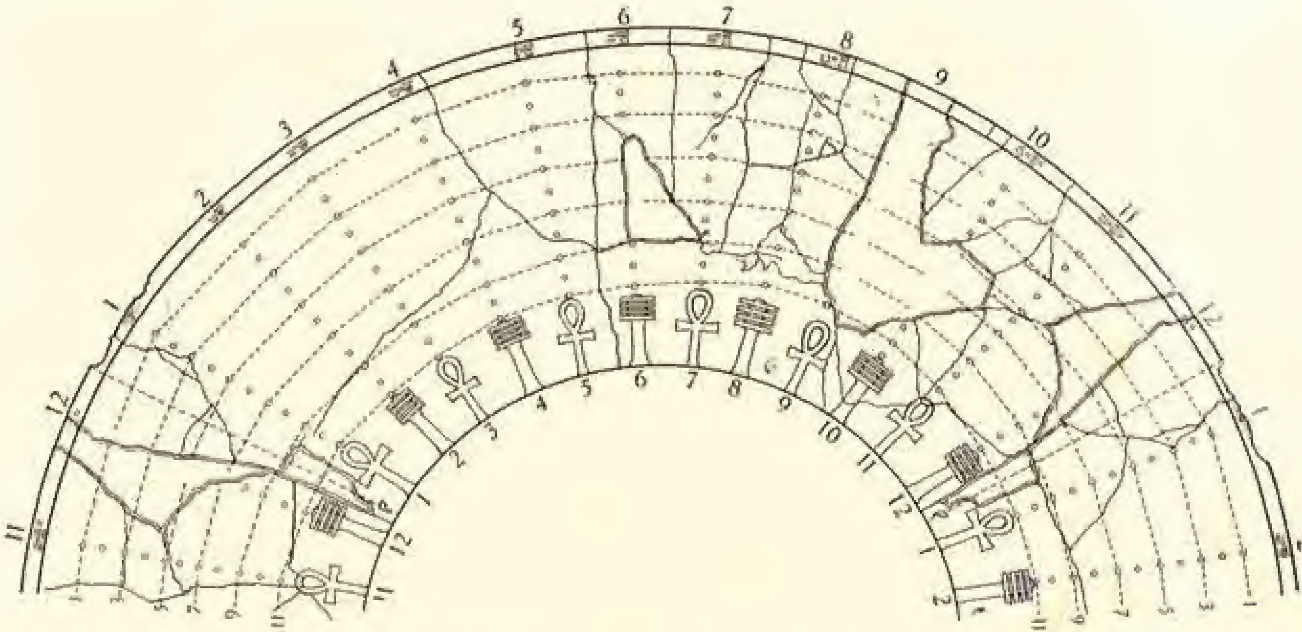

Plate XIa. THE CALIBRATIONS OF THE KARNAK WATER CLOCK.

Reproduced from Basserman-Jordan's "Zeitmessung und Uhren."

See Note 43.

(*facing page* 223)

clock was would delay the times of lowest and highest temperature by three months so that the month of highest temperature would be three months after the Summer Solstice.

He deduces from (1) that it would make the scales for the summer months shorter whereas it would make them at longer intervals apart as the water would fall further in a given time. He also states (AE. 1924. 47) that "the shortest and longest scales are those for September and March—not those for the solstice months as we should expect"—whereas they are about March (more correctly, April) and September (more correctly, October) respectively, as Sloley himself rightly states elsewhere (p. 45). The two errors, however, partly cancel each other, and it would be a legitimate deduction from the premises that the water would be expected to fall further in September than in March. The question, however, is whether the premises are sound. It is true that at a high temperature water flows quicker than at a low temperature but it is not known that the difference between extremes of temperature was such as to yield a ratio of flow of 12 fingerbreadths on the coldest night (which the theory places in Spring) and of 14 fingerbreadths on the hottest night (which the theory places in Autumn).

What is most incredible in the theory, however, is not the difference in rate of flow which in the open air would perhaps be possible but the notion that the hottest night was not reached till about three or four months after the solstice. It is universally admitted that at Thebes in the open air June and July are hottest. It may also be admitted that in the temples the air was cooler in summer than it was outside, and that the Water Clock may have been kept in the temple. But as the temples were not hermetically sealed and there was free transference of air

from outside, the supposition that the air in the temple was cooler in July than in September—October is not likely to commend itself to any but those with a preconceived notion of the requirements of the chronology.

But if we assume that the water fell 12 fingerbreadths at the Summer Solstice and 14 fingerbreadths at the Winter Solstice, allowance is already made for swifter flow in summer. (The slope of the clock is not quite correct to show an equal drop in equal times, with uniform temperature, but it is nearly so and for our purpose the error may be neglected.) Now in the Latitude of Thebes, about 26°, the night of the Summer Solstice was roughly 10 hours 22 minutes sidereal time while that of the Winter Solstice was roughly 13 hours 38 minutes, so that with no change in temperature, if the fall was 14f. in winter, the fall would be expected to be $\frac{622}{818}$ of 14f.=10·6+f. in summer. But the clock allows for a fall of 12f. in summer, thus taking account of the fact that it would run away more quickly owing to the heat.

But what seems to put Sloley's theory definitely out of court is the fact that an account of a similar water clock occurs in a tomb inscription of an official Amenemhet who lived under Ahmose I., Amenophis I., and Thothmes I., part of which reads as follows (AE. 1924. 45): "The first time I was honoured was in the reign of the majesty of the King of Upper and Lower Egypt Amenhotep I. . . . . while reading in all the books of the divine words. . . . (I found that the winter night was) 14 ("hours" long) . . . . . if the summer night was 12 "hours" long . . . . . (I found an increase in the length of the nights) from month to month (and) decrease month by month. . . . ."

The word here translated "hours" surely refers to fingerbreadth periods, the summer night measuring on

the clock 12 fingerbreadths and the winter night 14 fingerbreadths.

In the Karnak clock the distance in fingerbreadths that the water level dropped in a complete night of each month was approximately as follows (AE. 1924. 47) :

10th month	12f.
11th and 9th months	$12\frac{1}{3}$f.
12th and 8th months	$12\frac{2}{3}$f.
1st and 7th months	13f.
2nd and 6th months	$13\frac{1}{3}$f.
3rd and 5th months	$13\frac{2}{3}$f.
4th month	14f.

Who can reasonably doubt in face of the description of Amenemhet's clock that any theory in which the 12 fingerbreadth month is not a summer month must be wrong?

Yet Petrie (who does not often err* when one considers the very large number of theories which he has formulated) deduces (AE. 1924. 50) that "the hours were always equal as specified in the inscription which names the winter night as being two hours longer than in summer." But this deduction implies that at all periods of the year the mean day consisted of 26 equal hours and that the clocks were for use in a latitude of about $15\frac{1}{2}°$ where the winter night would be 2 such hours longer than the summer night. But (apart from the fact that the latitude does not tally) this is inconsistent with the star calendar[47] in the Ramesseum, which shows that at all seasons there were 12 hours of night, and with the water clock itself and even with Petrie's own theory (which requires at the equinoxes a night of 12, not 13, equal hours). The most reasonable view, therefore, seems to be that the word translated "hours" means really "fingerbreadth periods."

. . . . .

Sloley also discussed a cylindrical clock (the Edfu

* Naturally he errs more often than those who never have the courage to put forward theories at all. But only by trial and error can truth be ascertained.

clock) referable from its style to about 100 A.D. The scales were longest for the 4th month and shortest for the 10th month. The 4th month of the Alexandrian Calendar extended from 27th November to 26th December and thus the longest scale was that applicable to the month in which the Winter Solstice occurred and similarly the shortest to the Summer Solstice month, which is what one would expect, and is the same as in the Karnak clock on my theory.

Sir Flinders Petrie apparently assumed that the months were *κατὰ τοὺς ἀρχαίους χρόνους*. That would give in 100 A.D. 27th October to 26th November for the 4th month, when the scales were longest, which according to Petrie's theory would be at the time when the temples were hottest. The assumption that the temperature in the temples was hottest in November is an even greater assumption than it was necessary to make to support the temperature clock theory in the case of the Karnak clock (but Petrie mentions September, so perhaps he does not accept the dating of the clock to 100 A.D., though he does not say so).

Note 44. THE NINETEENTH DYNASTY.

In the record of Manetho preserved, the transition from the Eighteenth to the Nineteenth Dynasty is rather confused. The versions are as follows:—

	Africanus	*Eusebius*	*Eusebius* (Armenian Version)
End of Eighteenth	Armesses 5 Ramesses 1 Amenophath 19	Armais 5 Ramesses 68 Ammenophis 40	Armais 5 Ramesses 68 Menophis 40
Beginning of Nineteenth	Sethos 51 Rapsakes 61 Ammenephthes 20	Sethos 55 Rampses 66 Ammenephthes 40	Sethus 55 Rampses 66 Ammenephthis 40

Rameses I. who had a short reign is confused with Rameses II. of the Nineteenth. The astronomical evidence seems to indicate that Ramses I. preceded Horemheb who is apparently represented by Armais. The total length of Horemheb's reign was at least[39] as long as 59 years, *i.e.* to 1395 B.C., but Manetho according to his usual practice only shows the length of reign till the adoption of a coregent, namely Seti I. in 1450 B.C. Classical authors mention that Sesostris (Seti I.) left Armais (Horemheb) in charge of the kingdom (PE. II. 250). There is a record from the first year of Seti I. (BR. III. §158): "Year 1, 4th month of the 3rd season the last day . . . . His Majesty was in the city of Memphis performing the ceremonies of his father Harakhte, Ptah the Great, south of his wall Lord of Life of the two lands, Atum . . . . (His Majesty commanded) to found (divine offerings for his father Min-) Amon residing in Bohen . . . ." This gives no chronological clue for it is possibly merely the beginning of the Festival held every year on the New Year's Day in honour of Amon. Mention of Harakhte suggests that it

was the New Year's Day of the Sacred Calendar for the end of the old year of the Wandering Calendar was not then near either fixed Re Hor Khouti or the Winter Solstice Point, and only in the ancient Sacred Calendar was Re Hor Khouti the first month (which began 6 days after the date stated).

The New Year's Day of the Sacred Calendar was then about 23rd June Julian (10th June Gregorian) when, immediately after Sunset (Aton), Bootes (Ptah) was visible on the meridian. If, however, Harakhte is regarded as having no calendrical significance here it is conceivable that the date was in terms of the Wandering Calendar for the heliacal rising of Arcturus (Ptah) took place in September near the end of the Wandering Year at that epoch.

In his nineteenth year (1432-31) the 1st of the 11th month fell on 13th July the date of Rising of Sirius in South Egypt and he decreed[16] that the Epagomenal Days should be repeated to put back the 1st of the 1st month to 21st September close to the date of Rising of Spica.

The first year of Ramses II. is fixed from the Great Abydos inscription (BR. III. § 261). "On one of the days it happened in the year 1 the 3rd month of the 1st season the 23rd day at the feast—after the return of Amon to Karnak that he (the king) came forth favoured with might and victory from Amon Atum in Thebes and he rewarded him with myriads of years even to the duration of Re in heaven." Atum is the setting Sun and the reference evidently is to the Rising of Jupiter at nightfall. In 1394 B.C. Jupiter was in opposition with the Sun on 5th October and some days earlier would be rising at nightfall. The 23rd day of the 3rd month of the sacred calendar was equivalent to about 13th September. His first year might therefore be 1394-3 on one method of reckoning. In the same year there is a record of a Hymn to the Nile (LD.

175 a.) on the 10th of the 11th month which was then equivalent to 18th/17th July, close to the date of Rising of Sirius.

Above an inscription dated in his 3rd year 1st month of the second season day 4, which in 1391 B.C. was equivalent to 12th January, Ramses II. is shown (BR. III. § 284) offering incense to "Horus, lord of Bek" and "wine to Min residing in the mountain." On 12th January in that year Jupiter (Min) and Venus (Horus) were almost in exact conjunction in longitude 327½°.

A number of so-called Sed Festivals were held in Ramses II.'s reign. The first occurrence was in his 30th year. The "fifth royal jubilee" (BR. III. § 550) was recorded in the Gebelsileh inscription as in his 42nd year, in the El Kab inscription as in his 41st, so that there were two methods of reckoning his regnal years. His 30th year would be his 31st according to one method of reckoning, for the jubilee was celebrated after 30 years were completed as the lunations of the 31st year fell on almost the same dates of the stellar calendar as the lunations of the 1st year. (This jubilee Sed festival is not to be confused with the Sed festivals[33] at the Rising of Spica.) Ramses II. contrary to the usual practice repeated the celebration at short intervals.

In a Leiden Papyrus dated in his 52nd year a new moon festival[34] occurred on the 16th of the 6th month (AZ. XXVIII. 33). The 16th of the 6th month was then equivalent to 11th February (Julian). The astronomical New Moon was on 10th February 1343 B.C. and would be visible on the 11th.

The Stela[35] of the year 400 of Set-aa-Pehti Nubti which fell in his reign probably refers to the year 1392.

There is an inscription in the Ramesseum of Ramses II. referring to the Rising of the Sothis on New Year's Day

in the eleventh hour of night (AZ. XXVIII. 34), *i.e.* presumably at the beginning of the eleventh hour, two hours before dawn. This implies that the Sothis rose heliacally one month before the commencement of the 1st month of the year. This had been the case as regards the fixed calendar ever since Menkhet was made the 1st month in 2035 B.C. and Sirius a Sothis supplementary to Spica. Towards the end of the reign of Ramses II. it was approximately true also in regard to the Wandering Calendar which was then nearly coincident with the fixed calendar. Meyer however translates the passage as "on the morning" of New Year's Day (AG. XXIV. Pt. 2. 25) reading the hieroglyph as 'duait' instead of 'sebit.' If this is correct the reference may be to the Year of the Ancients, the Sothis being Spica which rose on New Year's Day in the original fixed civil calendar.

In Merenptah's reign occurred the Era of Menophres[10] (Merenptah), the coincidence of the Wandering Calendar with the Fixed Calendar about 1321-1317 B.C. 1317 also happened to be the year of one of the Great Conjunctions of Jupiter and Saturn.[9]

There is very little evidence for the remainder of the Dynasty. Africanus gives the total as 209 and, if his figure 61 for Rameses II. is corrected* to 66, which is given in Eusebius' version of Manetho, his total tallies with the regnal years given by him. But as we have seen Seti really reigned 55 years and even so there is a blank of six years to the beginning of Ramses III.'s reign astronomically fixed as 1230. We must either assume a period of anarchy or allot the six years to Siptah and Setnekht.

Possibly Tausert (Thuoris) was coregent with Siptah and Setnekht to nearly the end of the Dynasty for Manetho

* He is known from monumental records to have reigned into his 67th year.

records that in his reign Troy was taken. The Parian Marble dates the Fall of Troy in the beginning of the Twelfth Century but Herodotus places it about 1250 B.C. (CA. II. 497). A clue to the date is afforded by the Eclipse of Odysseus. As recorded in Homer's *Odyssey*, Odysseus predicted his own return "as the old moon wanes and the new appears." Just before he arrives Theoclymenus tells the suitors of their impending fate and says that "the Sun has perished out of heaven." The true position of Ithaca is a matter of dispute but possibly the eclipse is that of 14th March 1232 B.C. The fall of Troy might then be about 1235.

NOTE 45. AN ALTERATION OF THE CALENDAR IN THE REIGN OF SETI I.

In November 1929 (JEA.) Jaroslav Černý discussed the equivalence of year 1 of "repeating of births" to the 19th year of another system of reckoning which he showed to be probably the year of reign either of Seti I. or of Rameses XI.

I consider that the "repeating of births" means the repetition of the five epagomenal days—the "births" of the five planetary gods—in the 19th year of Seti I. Only on this assumption is it possible for the length of reign of Seti I., Rameses II., and Merenptah, to tally with the figures of Manetho. Further the 19th year of Seti was 1432-31 B.C., and in that year the 1st of the 11th month was the date of Rising of Sirius in South Egypt. By repeating the epagomenal days Seti also made the 1st of the 1st month (Menkhet) coincide with the Rising of Spica. On no other system of chronology so far proposed* would Seti's 19th year (or the 19th year of Ramses XI.) fall at a period when any purpose would be served by the repetition of the epagomenal days.

The following is therefore the position of the Wandering Calendar in Seti's 19th year:

Wandering Calendar	*Julian Date*
	1432 B.C.
1st Re Hor Khouti (11th month)	13th July (rising of Sirius)
1st Tekhi (12th month)	12th August
1st Epagomenal Day	11th September
1st Epagomenal Day (repeated)	16th September
1st Menkhet (1st month)	21st September (Rising of Spica)
1st Hathor (2nd month)	21st October

* My date for Seti was proposed (MB. 171) before I knew of these records.

Wandering Calendar	*Julian Date*
1st Kaherka (3rd month)	20th November
1st Shefbedet (4th month)	20th December
	1431 B.C.
1st Rekeh, great (5th month)	19th January
1st Rekeh, little (6th month)	18th February
1st Renenouti (7th month)	20th March
1st Khonsou (8th month)	19th April
1st Khent Khat (9th month)	19th May
1st Epet (10th month)	18th June

NOTE 46. THE ERA OF MENOPHRES.

Writing in the 4th Century A.D. the astronomer Theon said that from Menophres to the beginning of the Era of Diocletian was 1605 years. The Era of Diocletian being 284 A.D. this gives the date 1322 B.C. as the Era of Menophres in the opinion of Theon. Now from 1322 B.C. to 139 A.D., the year which Censorinus mentioned as commencing a Sothiac cycle, is 1,460 years and this is exactly the interval from the date of Rising of Sirius on 1st Thoth to its next cyclical Rising on that date in the opinion of the chronologists of the 4th Century. The calculation is approximately correct if the assumption is sound that there was no alteration in the calendar throughout that period and that the Rising of Sirius in the North of Egypt was at both dates considered more important than in the South, and more important than the Rising of any other star.

But I do not think we are warranted in taking Theon's statement as one of fact. It is a theory only. Behind the theory, however, there was clearly a tradition that some kind of Era occurred in the time of a pharaoh Menophres.

Names of pharaohs similar to Menophres which have been traced (WC. 10-11) are Mennofirre on a Hyksos scarab, Mernofirre Ai of the Thirteenth Dynasty, Merenptah of the Nineteenth Dynasty. As none of these fitted the date 1322 on the chronologies of recent years, Sir Flinders Petrie suggested that Menophres was perhaps to be identified with Ramses I., whose throne name was Menpetirah.

It is of course possible that Theon's guess that the Era

of Menophres commenced with the beginning of a Sothiac cycle was wholly erroneous. The Era referred to may have been the Great Festival of the Beginning of the Seasons. One of these Eras was that of " Maris " in 2409 B.C. which may quite well have been a Graecised form of Menophres, all that is left of the king 's name on Frag. No. 108 of the Turin Papyrus being Men . . . . . re.

On the other hand on my chronology 1322 does fall in the reign of Merenptah of the Nineteenth Dynasty, and also in his reign 1st Hathor (then the second month of the Wandering Calendar, but originally the first month) corresponded with the Rising of Spica thus coinciding with fixed Hathor and starting a new cycle.

I formerly supposed that the star calendar[47] in the tomb of Ramses VI. denoted this Era. This was based on Lepsius' translation of the months showing the first month as Thoth. If the first month was Thoth then the figure would denote approximately 1322-17 B.C. All that the figure shows however is the number, not the name, of each month, and from evidence of planetary risings[41] and the flooding of the Nile I have come to the conclusion that the New Cycle may have commenced without any reform being carried out and that Thoth may not have become the first month till 880 B.C.[52]

The star calendar, therefore, admits of a variety of interpretations.

NOTE 47. THE STAR CALENDAR OF RAMESES VI.*

Champollion discovered in the tomb of Ramses VI. what is obviously a star calendar for each of the twelve hours of night on the 1st and 16th of each month of the year. The 16th of each month is designated as 16th/15th which Brugsch takes to mean 16th of the fixed sacred calendar, 15th of the fixed civil calendar, holding that the dates in the sacred calendar commenced at sunset and in the civil calendar at midnight (BM. 106). A similar star calendar is in the tomb of Ramses IX.

In the table for the 16th of the 1st month the Sothis is shown as ruling the 12th hour and in that for the 1st of the 2nd month as ruling the 11th hour of night. Brugsch considered that the 11th hour of night was equivalent to dawn and on this hypothesis concluded that on the 16th of the 1st month the Sothis was rising (invisible) an hour after sunrise. Meyer adopted the more reasonable view that the 12th hour of night is the last hour before dawn and assumed that the Sothis was rising just before dawn (*i.e.*, was rising heliacally) on the 16th of the 1st month. A more natural interpretation, however, is to assume that if a star ruled an hour it would not be rising at the end of that hour but at the beginning. On this view the calendar shows the Sothis rising an hour before dawn on the 16th of the 1st month which means that it would be rising heliacally (and therefore ruling the 1st hour of the day) on the 1st of the 1st month.

* See Plates XII. and XIII.

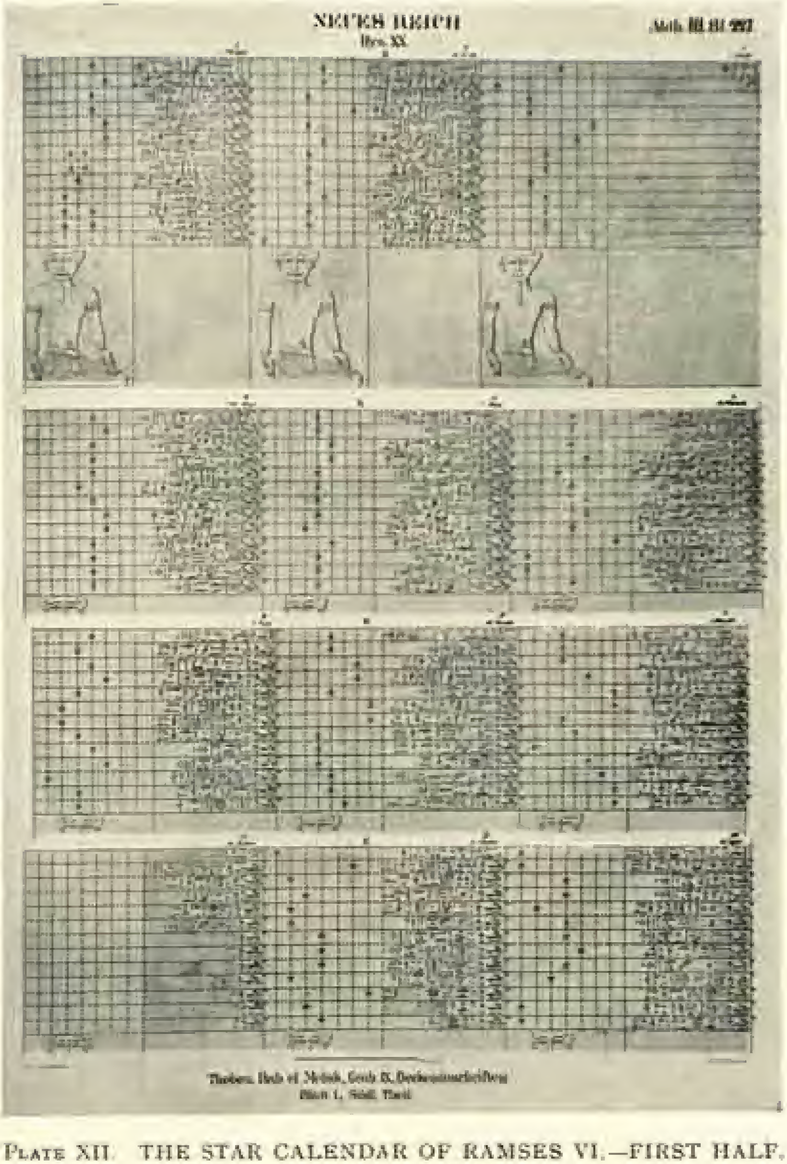

PLATE XII. THE STAR CALENDAR OF RAMSES VI.—FIRST HALF.

Reproduced from Lepsius' "Denkmäler," III. 227.

See Note 47. (*facing page* 236)

If the calendar is a fixed calendar it cannot show the year from the rising of the stars for they would rise in the same succession at all epochs (with slight differences due to differences in rate of precession). It may represent the year of the ancients of which the 1st month was Hathor and the Sothis Spica, or the reformed year of which the 1st month was Thoth and the Sothis Sirius. It is doubtful, however, whether Thoth was the 1st month as early as the time of Ramses II.

If the months are denoted in terms of the Wandering Calendar there are four possibilities, according to whether the 1st month was Menkhet or Thoth and the Sothis Spica or Sirius.

(1)	If the 1st	month	was	Menkhet and Sothis Spica the approximate date would be c.1431 B.C.
(2)	"	"	"	Thoth and Sothis Spica the approximate date would be c.1593 B.C.
(3)	"	"	"	Menkhet and Sothis Sirius the approximate date would be c.1197-1177 B.C.
(4)	"	"	"	Thoth and Sothis Sirius the approximate date would be c.1317 B.C.

If the first of these is accepted the calendar represents a date about the year of the Reform of Seti I. The second may be ruled out for there is definite evidence that Thoth was not yet the first month in 1593 B.C. The third is possible for Sirius though not the first of fixed Menkhet would be used as one of the measuring stars when Menkhet was first month. The fourth is possible and may be the actual year of Reform close to the date denoted by Theon as the Era of Menophres.

My present view, however, is that it is probable that Menkhet remained the first month till 880 B.C. It may be, therefore, that the figure is in accord with the third hypothesis, which yields a date near that of Rameses VI. (The symbol used for the Sothis is not the cow horns, usually used for Spica, but merely the Sothic pyramidal

symbol applicable to any measuring star.) Mahler claims to have identified in the calendar the positions of Jupiter and Saturn from which he deduced 1198 B.C. Their relative positions would be approximately the same also in 1317 B.C.

But perhaps it is best to regard it as a fixed calendar measured from Spica, not denoting any specified epoch but for use at all periods for measuring time at night. In that case, however, the conjectures of Brugsch as to the identifications of stars in the list would require to be revised as they were conjectured because of the approximate distance of the stars from the Sothis, which he held to be Sirius.

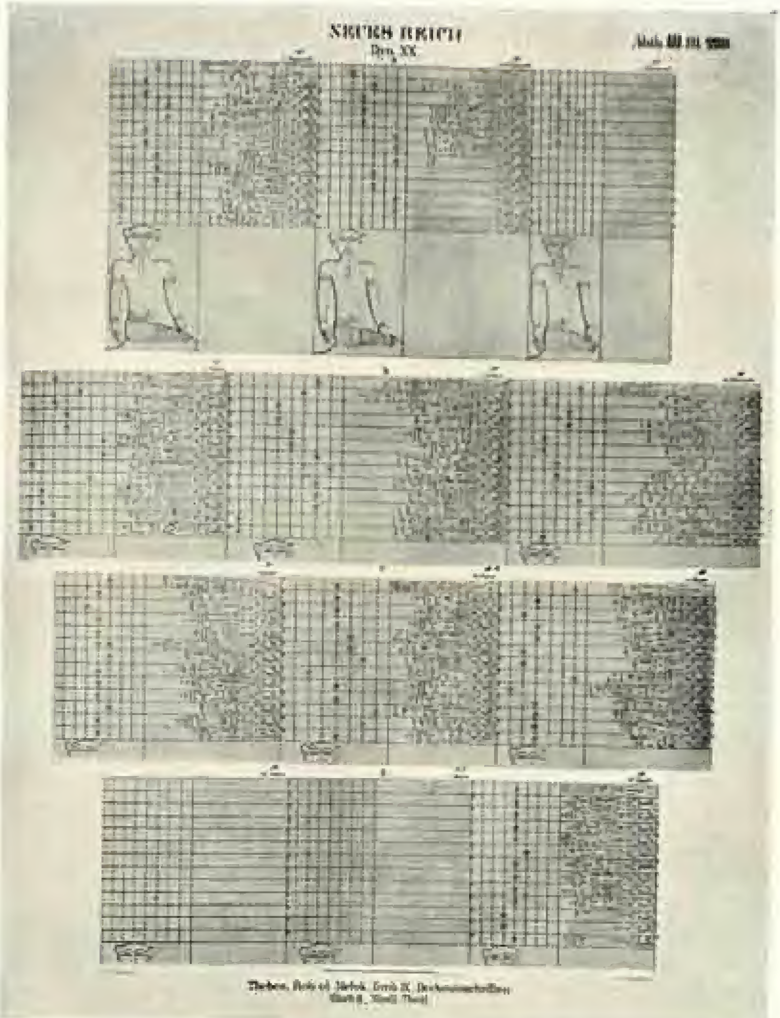

PLATE XIII. THE STAR CALENDAR OF RAMSES VI.—SECOND HALF.

Reproduced from Lepsius' "Denkmäler," III. 228.

See Note 47. (*facing page* 238)

Note 48. THE TWENTIETH DYNASTY.

The order of the kings of this dynasty is not yet certain. That usually favoured, and tabulated and examined by Peet (JEA. XIV. 73), is here followed. It is almost the same as that given by the Sothis Book.[31]

Rameses III. in his 16th year found new offerings for Amon in the 10th month. Jupiter rose about 17th May in 1215 B.C. which falls in the 10th month (Epiphi). As the anniversary of his accession was celebrated on the 26th of the preceding month, we may assume that he was crowned on the 26th of the 9th month (then Payni) equivalent to 24th April, 1230 B.C.

The Calendar[32] of Medinet Habu is for the year 1225 B.C. As it was inscribed about the king's 12th year it follows that 1225 must have fallen within his first 12 years (as it does in the chronology).

In his 29th year on the 28th day of a month of the 3rd season he was making preparations for the Sed Festival[33] (BR. IV. § 413). In 1201 B.C. the astronomical new moon was on 24th September and would become visible one or two days later close to the date of Rising of Spica.

From the Harris Papyrus (BR. IV. § 154) it seems clear that Ramses died between the 16th of the 10th month in his 31st year and the 6th of the 11th month in what would have been his 32nd year, *i.e.*, between 6th May and 26th May 1199 B.C.

October 1198 B.C. is proved to fall in the 2nd year of Ramses IV. for it is recorded (BR. IV. §459 ff.) that in that year he made offerings to Amon Re, Min (Jupiter),

Isis (Mercury), and Mat (Saturn) at the same time. The Great Conjunction of Jupiter and Saturn[9] occurred in that year. Jupiter rose about 22nd October and Saturn about 26th October. That of itself would really be sufficient in view of the knowledge that he succeeded Ramses III., but it is checked conclusively by the fact that Mercury's morning rising occurred on 27th October thus tallying completely. The ceremonies no doubt usually commenced before the planets set and continued up to the date of rising. The first to set would be Jupiter about 24th September.

The star calendar[47] in the tomb of Ramses VI. may represent this important year though there are other possible dates with which it might correspond.

As his coronation is known to have been 15th of the 1st month (Menkhet, not Thoth) he must have been crowned on 8th August, 1199 B.C. shortly after the death of Ramses III.

In his 4th year 1196-95 on the 10th day of the 3rd month (BR. IV. § 470 ff.) he makes a prayer for long life. The date corresponds to 1st October 1195 B.C., about seven days after the Rising of Spica.

There is no astronomical evidence available after Ramses IV. till we reach Khaemwese (usually now regarded as Ramses IX). In the 10th year of his reign the High Priest Amenhotep "was placed in independent control of all the endowments of Amen at a special court held in the temple on the 19th day of the 3rd* month the gods Mentu and Amen Ra and the king being named as formal witnesses" (PE. III. 180). This might be done at the annual ceremony of the Appearance of Amon. Jupiter rose about 4th October 1163 B.C. The 19th day of the 3rd month

* I have altered "Hathor" to "3rd month" (cf. BR. IV. § 495).

was then equivalent to 2nd October. This was its nearest Rising to Spica in its 12 year cycle. As the reigns of Ramses V., VI., VII., VIII., and 10 years of Ramses IX. together are known to exceed 25 years we are limited in our search for a date to the period subsequent to 1168 B.C. Between 1168 and 1116 (which is an astronomically possible year) there is no date of rising tallying so exactly as in 1163 and we may therefore regard October 1163 as in the 10th year of Ramses IX. This makes it possible that this was the Amenhotep, who was a son of Rameses-Nekhtu, a priest in the reign of Ramses III. (PE. III. 175). An Abydos stela of the 27th year of Ramses XI. dated the 8th of the 12th month records an offering to Osiris. If this was at the annual rising it must refer to the rising about 1st June 1096 B.C., the only rising near the 8th of the 12th month (then = 2nd June) near the date of Ramses XI.

Africanus' figure 135 years for the length of the dynasty is therefore probably correct, and if we accept it the dynasty terminated in 1095. It is to be observed, however, that error has crept into Africanus' totals for individual kings in the next dynasty to which he allots 130 years in place of 169, thus making the combined total for Twentieth and Twenty-first Dynasties 265 in place of 304. Eusebius gives 172 (Armenian Version) for the Twentieth and 130 for the Twenty-first yielding 302. It may be that Hrihor, Nesubenebded and Pesibkheno I. should really be reckoned in the Twentieth Dynasty which thus would have 12 kings ruling about 172 years, if Pesibkheno died about 1058. Though Paynozem I. began to reign about 1062, the new dynasty might be reckoned from Pesibkheno's death. The totals for the dynasties may have been obtained from Manetho but the erroneous regnal years of the kings filled in from other sources.

NOTE 49. THE CALENDAR OF MEDINET HABU.

There is a calendar in the temple erected by Ramses III. at Medinet Habu containing a list of various Feasts. It is quoted by Brugsch (BH. II. 156) as follows (save that he names the months instead of numbering them). I have omitted the majority of his bracketed conjectures :

1st of 1st month	Rising of the Sothis Star, a sacrifice for Amon
17th " "	Eve of the Uaga Feast
18th " "	Uaga Feast
19th " "	Feast of Thut
22nd " "	Feast of the Great Manifestation of Osiris
17th of 2nd month	Eve of the Amon Feast of Api
19th-23rd "	First five days of the Amon Feast of Api
12th of 3rd month	Concluding day of the Festival of Api
17th " "	Special feast after the Festival of Api
1st of 4th month	Feast of Hathor
20th " "	Feast of Sacrifice
21st " "	Opening of the tomb
22nd " "	Feast of the hoeing of the earth
23rd " "	Preparation of the sacrificial altar in the tomb
24th " "	Exhibition of the corpse of Sokar in the midst of the sacrifice
25th " "	Feast of the (mourning) goddesses
26th " "	Feast of Sokar
27th " "	Feast of the palms
28th " "	Feast of the procession of the obelisk
30th " "	Feast of the exhibition of the image of Did
1st of 5th month	Feast of the coronation of Horus, which served also for that of king Ramses III.
6th " "	A new Amon feast founded by Ramses III.
22nd " "	Heri—feast
29th " "	Day of the exhibition of the meadow

The feasts which follow are obliterated.

Brugsch supposes that the 1st month is Thoth but it is far more probable that this is the fixed sacred calendar[53] in which the Feast of Hathor at the Rising of Spica always fell on the 1st of the 4th month (Hathor). As it so happens, in the reign of Ramses III. and close to the actual date of this calendar 1st Khoiak did coincide with 1st Hathor fixed, but Khoiak was probably not yet the 4th

month of the Wandering Calendar as is shown by the date of the exceptional flooding of the Nile in the 3rd year of Uasarkon of the Twenty-second Dynasty.[55]

Brugsch assumes that the Sothic symbol on the 1st of the 1st month represents the Rising of Sirius, but it is the Birth of Ra, the Sun god, which when the sacred calendar originated in the fifteenth millennium corresponded with the Winter Solstice, and in this calendar merely indicates the New Year's Day.

The Feast of Thoth on the 19th of the 1st month may refer to the Rising of Thoth (Sirius) on 14th July, 72 days before the Rising of Spica on the 1st of the 4th month (24th September), (though there is some evidence—perhaps a little dubious—of this Festival being held also at an earlier epoch on the same date when it did not correspond to the Rising of Sirius). The rate of precession of Sirius and Spica is different and the interval only remained at 72 days for about 200 years.

But the date of the Great Manifestation of Osiris on 22nd of the 1st month (17th July) gives us a more precise check for this probably refers to the annual festival at the heliacal Rising of Jupiter. Calculation yields the date 14th July for the Rising of Jupiter in 1225 B.C. and it may have risen on the 17th. If Jupiter is taken alone 1213 would also approximately fit but 1225 is proved to be the correct year from the fact that the Feast of Sokar was held on the 26th of the 4th month (19th October). Now the Feast of Sokar[51] was held in connection with the period of invisibility of Mercury at inferior conjunction, and 19th October is precisely the day of Mercury's evening setting nearest to Spica in that year. The chance of both Mercury and Jupiter tallying so closely is more remote than $\frac{4 \times 10}{360 \times 360} = \frac{1}{3240}$ and it is unlikely that within 45 years on either side of 1225 another year could be found thus to tally.

The feast of the hoeing of the earth on the 22nd of the 4th month (15th October, Julian=4th October, Gregorian) seems exceptionally early, but perhaps this was merely symbolical of the commencement of the subsiding of the Nile, and the actual agricultural operation did not begin till later.*

Some of the Feast Days are of course merely commemorative and the dates of celebration may have been handed down from much earlier times. Similarly some of the dates which originated in this calendar may have acquired a special sanctity at a later epoch.

* Plutarch, however, assigned it to October when he said (*De Isid.* 69) that the Feast in honour of Isis fell in the month "in which the Pleiades appear, and the husbandmen begin to sow their corn, called by the Egyptians Athyr." In his time the Pleiades rose at nightfall in October close to the date of heliacal rising of Spica, though Athyr of the Alexandrian Calendar corresponded mainly to November.

NOTE 50. THE TWENTY-FIRST DYNASTY.

Hrihor probably became High Priest early in the reign of Ramses X. He was already prominent in the reign of Ramses XI. in whose reign there is an inscription of his (BR. IV. § 609) in the temple of Khonsu, when he was "making for him a temple for the first time in the likeness of the horizon of heaven." Further it is stated (§ 616) "a space of 20 years is that which Amon Re king of gods gives to thee . . . ." The only astronomical period of 20 years is the interval between ordinary conjunctions of Jupiter and Saturn, but this obviously is the first time after the lapse of a long period that the conjunction occurred in fixed Khonsu (the month of Mars), corresponding to 24th March to 22nd April. Calculation shows that Jupiter rose about 22nd March (quite possibly on 24th March) and Saturn about 13th March in 1098 B.C. This would be the first occasion after the lapse of about 800 years that the conjunction occurred near the beginning of fixed Khonsu. (No doubt the building of the "temple" was commenced some time before, the date and place of conjunction having been calculated in advance. "Temple" would not necessarily signify a large building, possibly merely a chamber.) 1098 as we have seen[49] fell in the reign of Ramses XI.

The first portion of Paynozem I.'s reign is accurately determined by the astronomical evidence for in his 25th year the feast of Amon Re was in progress on the 29th day of the 11th month (BR. IV. § 652). This corresponded to 21st May of the sacred calendar and calculation yields 20th May as the approximate date of Rising of Jupiter in

1037 B.C. The record continues, referring to what must have been his 26th year, "after the 4th month of the third season on the 5th day of the feast 'Birth of Isis' the Majesty of this august god, lord of gods, Amon Re, king of gods, appeared . . ."

Thus Jupiter rose on the fifth day of the feast which happened to be the fourth epagomenal day the "Birth of Isis," equivalent in 1036 B.C. to 25th June of the sacred calendar. Calculation yields a date of about 23rd June for the Rising of Jupiter in that year. Thus May 1037 fell in his 25th year, and June 1036 in his 26th year, so that his first year must have begun roughly between July 1062 and April 1061.

The conjunction which occurred for the first time in Hrihor's priesthood occurred a third time in the priesthood of Paynozem the priest who never became king. It is thus recorded (BR. IV. § 671), "on this day in the house of Amon Re king of gods on the sixth day of the month appeared the august god the lord of gods Amon Re, king of gods, Mut the great mistress of Ishru and Khonsu in Thebes Beautiful Rest." In 979 B.C. the 6th of the 11th month was equivalent to 1st April and calculation shows that Saturn rose about 1st April and Jupiter about 4th April in that year. Amon (Jupiter) and Mut (Saturn) were thus rising with the stars of fixed Khonsu. 979 B.C. must, therefore, have fallen in the priesthood of Paynozem.

The burial of Paynozem II., not to be identified with the priest, was dated in the year 16 of a king (PE. III. 191). As we shall see,[88] Manetho commences the Twenty-second Dynasty with the fifteenth year of Sheshonk discounting the overlapping of the Twenty-first Dynasty to that time and it is presumably in Sheshonk's 16th year that Paynozem was buried, having died at the close of the 15th year.

It is perhaps permissible to conjecture that the dispute

in the 25th year of Paynozem I. 1038-37 was due to the fact that the king was not present at Thebes to celebrate the conjunction of Jupiter and Saturn in Khonsu in that year. It will be recollected[39] that Akhenaten caused a furore by refusing to celebrate one of the great conjunctions near Spica. Paynozem I. as we saw, was however, careful to celebrate the Rising of Jupiter in the following year.

It is clear that the Kings and Priests of this Dynasty paid much more attention to Khonsou the god of Aries than they did to Hathor the goddess of the opposite sign Libra, though in point of fact there were no great conjunctions near Spica (Hathor) during the Dynasty.

NOTE 51. RELICS FROM MERYET-AMUN'S COFFIN.

Mr. H. E. Winlock in the *Bulletin of the Metropolitan Museum of Art* (December 1930) describes the finding of the tomb of Meryet-Amun, daughter of Thothmes III. at Thebes. Her tomb was plundered by thieves in the Twenty-first Dynasty and restored by necropolis officials on the 28th day of the 7th month in the 19th year of Paynozem I. as recorded by them on the mummy. The season of year to which this date then corresponded is shown approximately by the presence in her coffin of acacia blossoms and persea twigs bearing half-ripe fruit.

According to Mr. Winlock at the present day there is probably not more than one persea tree in Egypt, that in Cairo. He has kindly replied to my queries in regard to date of ripening as follows: "There were a few fruits ripe on it in the first week in February this year (1931) but the most of them are coming ripe just now (25th February). I believe that you can count on things ripening about a month earlier here in Thebes and if so the fruiting season in ancient Thebes should have begun about the 1st of January."

As regards acacia he states that this begins blossoming at Thebes about 1st November and that the blossoms are very plentiful in the end of November. As regards the end of December he writes, "There were a few—but a very few—acacia blossoms still on the trees toward the end of December this year here in Thebes. It is true that enough could have been gathered to have made the collar, but it

would have been nothing like so easy to find them as at the end of November."

On my chronology the 19th year of Paynozem I. was 1044-43 and this does not greatly differ from the many other estimates. Now it is not certain at what point the calendar reform took place by which Thoth was made the 1st month instead of Menkhet. Menkhet was undoubtedly the 1st month in the time of the Eighteenth Dynasty[87] and Thoth was the 1st month by the Eighth Century B.C.[82] If, however, the date of flooding in Uasarkon's 3rd year (886 B.C.) namely "12th of the 5th month" is not a scribal error[83] Menkhet must still have been the 1st month then. On this assumption in 1044-3 B.C. the 28th of the 7th month was equivalent to about 9th January (Julian) = 30th December (Gregorian). If, however, the calendar had by this time been reformed and Thoth was the 1st month the 28th of the 7th month would be equivalent to about 4th December (Julian) = 24th November (Gregorian).

Disregarding extraneous evidence we have to decide whether the acacia blossoms and half-ripe persea fruits were more likely to be picked about 30th December or about 24th November. I think it may be agreed that it would be certainly possible to pick both in the end of December, while it is at least doubtful whether half-ripe persea fruits could be found as early as November. The evidence is inconclusive but perhaps slightly favours the view that Menkhet was still the first month and that the flood record of Uasarkon is, therefore, trustworthy.

NOTE 52. A ZODIAC OF 880 B.C.

Brugsch discovered at Thebes in 1857 (BL. I. 30) an astronomical figure* of special interest inscribed on the inside of a coffin and its lid. From the inscription on the outside of the coffin Brugsch supposed that it was of the Ptolemaic or Roman period.

The astronomical figure shows the six signs Cancer to Sagittarius on one side of a human figure, and the other six signs Capricorn to Gemini on the other side. It is of special interest because of the information written beside some of the signs. Thus beside Leo is written (u) "Hor-pe-seta" (Jupiter) and "Hor-pe-ka" (Saturn). Beside Virgo is written (v) "Hor-teser" which Brugsch translates as Horus the red, and identifies with Mars. Between Libra and Scorpio is written (w) "Sebek" which Brugsch identifies with Mercury. Between Scorpio and Sagittarius is written (y) "pe-neter-tau," "the god of the morning" (Venus).

Possible dates for the figure are limited. It is a date of appearance of the Phœnix[8] (the conjunction of Jupiter and Saturn) in Leo, and in this connection it is interesting to note that the small semi-circle above the head of the central figure shows the deceased in adoration before Ra, with an inscription from one of the chapters of funeral ritual relating to the "voyage of the bird Bennu (the Phœnix) to Abydos and of Osiris to Dudu." (BL. I. 35.) Now if Venus was between Scorpio and Sagittarius, the position of the Sun must have been somewhere between

* See Plate XIV.

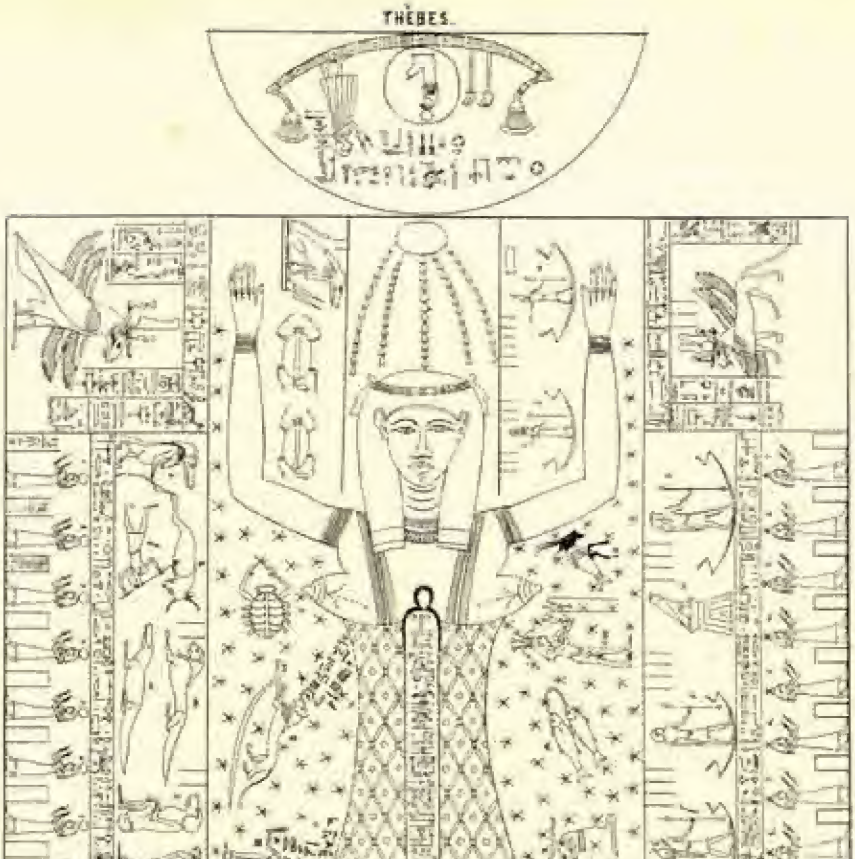

PLATE XIV. A ZODIAC OF 880 B.C.
(Reproduced from Brugsch's "Recueil.")
See Note 52.

(*facing page* 250)

Libra and Capricorn. The date cannot have been, therefore, that of the heliacal Rising of Jupiter and Saturn, but may have been that of the Rising of Spica. Jupiter and Saturn were together in Leo in October 145 B.C. and Mars in Virgo, but Venus was not between Scorpio and Sagittarius at the same time that Mercury was between Libra and Scorpio. I do not regard it as impossible that this may have been the year intended. It is the only date in Ptolemaic or Roman times in which the planetary positions can claim any likeness to the figure.

What seems to me more probable, however, is that like other zodiacs of Ptolemaic times it was a copy of an older zodiac and that the description of the planets given by the Ptolemaic scribe are not strictly accurate. The scribe evidently thought Sebek was Mercury and the red Horus Mars (*i.e.*, if Brugsch is correct in his reading of the word "red") but probably in the original the symbol was that of the little Horus, namely the child of Isis (Mercury). Sebek the crocodile is a constellation near the longitude of Scorpio the sign of Mars. It, like the pig, was sacred to Set (Mars) and the star of Sebek was, therefore, Mars, though Ptolemaic commentators may have thought it was Mercury. The "god of the morning" is, of course, the greater Horus (Venus).

Accepting these identifications we obtain the date of Rising of Spica in 880 B.C. (*c.* 25th-27th September) as a possible date, for in the zodiac measured from Spica Jupiter and Saturn were in Leo, Mercury was in Virgo, Mars was in the end of Libra and Venus was in the end of Scorpio, thus tallying with the figure (though it is to be noted that Jupiter and Saturn were near the end, not the beginning of Leo as they should be if the spacing in the figure is correct. But perhaps all that the scribe intended to denote was that they were in Leo.)

The figure is presumably that of an important era. It may be that it was regarded as important because of the Phœnix period. On the other hand it may be important for another reason.

Reckoning back from Ptolemy's eclipse[50] of 721 B.C. it is found that, if there was no change in the calendar between 880 and 721, 1st Phamenoth (the 7th month) coincided in 880 with 27th September, so that the date of the figure represents not only a date when Spica rose when Jupiter and Saturn were near conjunction but also when (in the reformed calendar) a month began close to the date of Rising of Spica.

But there is still a further point. In the third year of Osorkon II. (886 B.C.) there was an exceptional flooding (BR. IV. § 742) of the Nile on the 12th of the 5th month.* But if the 5th month was then Tiby and there was no change in the calendar between that date and 721 B.C. the equivalent Julian date is 11th August, *i.e.* 3rd August Gregorian; but, in modern times, the limits of date for High Nile at Cairo are 25th August to 27th October Gregorian (BA. 7) so that it seems probable that in 886 B.C. the Egyptians were still using the calendar as it was in the Nineteenth Dynasty with Menkhet as 1st month. By that calendar the 12th of the 5th month (Mekhir) corresponded in 886 B.C. to 16th September Julian, 8th September Gregorian, which falls well within the limits of possible High Nile. This calendrical theory seems to be confirmed[51] by the relics in Meryet Amun's coffin.

It seems probable, therefore, that in 880 B.C. before the Great Conjunction took place it was decided to Reform the Calendar by transferring the Epagomenae to before

* Meyer states the date as 12th of the 7th month (MG. II. 2.59) though aware that Breasted in full knowledge of the difficulties adhered to the reading "first month of the second season," but assumed that the scribe's transliteration was incorrect.

Thoth, making it the first month instead of Menkhet thus omitting the Epagomenae for that one year to make 1st Phamenoth equivalent to the Rising of Spica.

The Wandering Calendar in the year of Reform was thus as follows:

Wandering Calendar	*Julian Date*
	881 B.C.
25th Mekhir (5th month)	27th September (Rising of Spica)
25th Phamenoth (6th month)	27th October
25th Pharmouthi (7th month)	26th November
25th Pakhon (8th month)	26th December
	880 B.C.
25th Payni (9th month)	25th January
25th Epiphi (10th month)	24th February
25th Mesore (11th month)	26th March
25th Thoth (12th month now 1st month)	25th April
30th Thoth	30th April
(Epagomenal Days omitted)	
1st Menkhet (2nd month)	1st May
1st Hathor (3rd month)	31st May
1st Khoiak (4th month)	30th June
20th Khoiak (4th month)	19th July (Rising of Sirius)
1st Tybi (5th month)	30th July
1st Mekhir (6th month)	29th August
29th Mekhir (6th month)	26th September
1st Phamenoth (7th month)	27th September (Rising of Spica)

It will be noted that when 29th Mekhir was reached it would be found necessary also to miss out 30th Mekhir in order to make the 1st of Phamenoth correspond to the Rising of Spica in this important year, or possibly this difference of a day took place at some earlier period, or again it may simply have been due to some change at some time in the method of reckoning the dates, which at one period may have been reckoned from sunset, at another from midnight.

1st Thoth of the Fixed Calendar (Rising of Sirius), would also become the first day of the Reformed Fixed Year. It is probable that at this period more attention was paid to its Rising in the North (19th July Julian) than in the South, so that the 1st day of the Reformed Fixed Calendar was equivalent to 11th July Gregorian, the same seasonal date to which the Rising of Spica approximately corre-

sponded when the 365 day calendar originated[1] in the 56th century B.C. when 11th July Gregorian was equivalent to 24th August Julian.

. . . . .

Reverting to the zodiac we may note certain other features of interest. Within the upraised arm of the figure are two small figures. One of them (a) probably represents Ptah (not Orion as usually stated). The other represents the goddess of the New Year (not Sirius as usually stated). That the former probably represents Ptah is shown by the oblong[29] Denderah zodiac, and the zodiac[32] in the Ramesseum. In the Denderah zodiac* the figure is shown to the left of the Twins. If it is held to represent a star or constellation it cannot refer to Orion which was in the first decanate of Gemini and is shown in that position in the decans below by a figure very similar but not holding the arms outstretched. At the date which the Denderah zodiac represents, however, Menkhet, then the last month of the Wandering Calendar, corresponded with the rising of the stars of Gemini. (Menkhet of the fixed calendar corresponded with the rising of the stars of Virgo.) In the Ramesseum zodiac† the figure also is under Wandering Menkhet which at the date to which it refers happened to correspond with the stars of Pisces. It seems probable, therefore, that it represents Ptah which was the lord of Menkhet. It is shown in its correct position relative to fixed Menkhet in a table of decanates from a tomb at Biban-el-molouk (BL. Plate XIX.). Brugsch has unfortunately numbered these from left to right instead of right to left. The portions on the extreme right are much erased but sections 38-37-36 might correspond to Cancer (Re Hor Khouti) with which the sacred calendar began and 35-34-33

* See Plate V.
† See Plate VII.

to Leo (Tekhi). Under 32-31-30 (Virgo) is shown the figure of Ptah, while under 29 (the beginning of Libra) are shown hieroglyphs which Brugsch reads as Chetmaon followed by a number of stars. It, no doubt, refers to the "Queen of the decan stars" namely Spica. 26-25-24 being expected to correspond to Scorpio, 23-22-21 would correspond to Sagittarius. This is confirmed by the fact that the middle decan shows a bull's head and a portion of its body as appears in the Denderah oblong zodiac in Sagittarius as a bull's head mounted on a leg representing the Northern enemies smitten by Horus. It probably astronomically signifies the constellation now known as Draco. Its principal stars lay between Sagittarius and the pole. It is shown again in the last sign Gemini (in No. 3) with the hieroglyphic inscription "gȧr-kenmout" which Brugsch translates "the under side of the leg of Kenmout." When Gemini was on the South meridian the principal stars of Draco would be near the North meridian (nearer the North horizon than the pole of the heavens) in an upside down position as compared with their position when Sagittarius was on the meridian. According to one of the Greek myths in connection with the constellation it "represented the serpent Python slain by Apollo after the deluge." This may be a corruption of the Egyptian story of the achievements of the Horus king (Khosekhemui) since the Greeks identified Horus with Apollo. (Some think the Northerner was the Great Bear.)

That the other figure (b) in the 880 B.C. zodiac represents the goddess of the New Year is clear from the Denderah oblong zodiac where in the decanates it stands* below the ear of corn and oxheaded figure dividing Virgo from Libra, *i.e.* below Spica the "New Year of the

* It is clearer in the reproduction in Boll's sphaera than in Plate V. of this book.

Ancients." Under the signs Cancer to Sagittarius are a number of figures. That to the left (i) is the same figure as is shown above Spica, No. 61 in the Denderah circular zodiac. It probably there referred to the beginning of the fixed year with Spica. Here it apparently is the clue to the three larger groups in front of it and indicates that these are the signs heliacally rising in the "seasons" of the reformed Wandering Calendar of 880 B.C. Thus the group to the right contains the Cynocephalus (o) typical of Aries and a bird (p) possibly denoting fixed Re Hor Khouti (Cancer). In 880 B.C. the first season corresponded to Aries to Cancer. The group in the middle consists of a lion (m) typical of Leo and the crocodile Sebek (n) typical of Scorpio. In 880 B.C. the second season corresponded to Leo to Scorpio. The left hand section shows Horus smiting his enemies (l and k), which as stated above is shown on the oblong Denderah zodiac in Sagittarius. In 880 B.C. the third season began with Sagittarius. (It is interesting to note that in later times the smiting of his enemies by Horus was celebrated on 7th Tybi, and Tybi of the fixed calendar corresponded to the rising of the stars of Sagittarius.)

Below the signs Capricorn to Gemini are shown the symbols of the planets.

The orientations of Egyptian Temples discussed by Lockyer in his *Dawn of Astronomy* (1894) rather tend to confirm my views as to the identification of some of the stars.

The Ox-leg constellation referred to above is mentioned for example in an inscription in connection with the founding of the Temple of Hathor at Denderah: "Looking to the sky at the course of the rising stars and recognising the *ak* of the Bull's thigh constellation I establish the corners of the temple of Her Majesty." The *ak* of the

constellation must therefore be a star which rises and sets. Further the Temple of Hathor has an amplitude of 71½° in a North East direction which Lockyer calculated would point at the rising of a star with a declination about 58 to 59¾° North. Over a long period γ Draconis satisfied that condition. Not only is this so but Spica (Hathor) set about the time that γ Draconis or stars near it rose (over a considerable period) thus making the rising of this portion of the Constellation Draco a matter of some importance in the Hathor cult. (Lockyer indeed seems to have imagined that γ Draconis was Hathor.)

The Temple of Ptah at Karnak, known to have been built by Thothmes III., has an amplitude 35° W. of North and thus pointed at the setting of a star with a declination about 32½° North. In the reign of Thothmes III. 1615-1561 Capella, the brightest star of Auriga, according to Lockyer had that declination, and he supposed that it was the star indicated. But we must not assume that the priest's angle of vision only embraced 1 degree of the heavens, but that he might be able to see a whole constellation, or at least a large part of one. If the priest's range of vision was from 25 to 45 North of West he would be able to see the setting of Arcturus, the brightest star of Bootes which I have elsewhere[61] suggested may have been Ptah. (The priests may have known that by precession its declination would in course of time be further south.) The more definite alignment towards Capella, however, it must be admitted, rather favours the view that Auriga was Ptah. Auriga was sometimes referred to in Roman myth as the son of Vulcan, and, as Ptah became identified with the Greek Hephaestus and Roman Vulcan, this view is possibly correct. On the other hand, as the month Menkhet was sacred to Ptah we are forced to assume in the case of Capella that it was the date of its

feast Jupiter rose. If there is a possible 10 days for Jupiter rising, it would rise within that period on an average about once in 36 years and in such cases the approximate date would first require to be determined otherwise. There are, however, cases where the exact date of rising is stated.

There were also fortunately certain risings to which more importance was paid than others. I have elsewhere explained how the "year of the ancients" began with the rising of Spica and how later the fixed civil calendar began with Sirius. Spica marked the commencement of Hathor the first month and Sirius marked the beginning of Thoth. Whenever Jupiter rose near Spica or Sirius the rising was more important. Thus in the Greenfield Papyrus there are chapters "of being close to Thoth" (XCVI.-XCVII.) and "of being close to Hathor" (CIII.). Now though once in 12 years the nearest rising to each occurs the rising is not close except about once in 365 years in each case. Unfortunately in matters of religious ceremonial we cannot always be quite sure whether the Wandering Calendar or a fixed calendar is being used. In one particular instance it is, however, clear that a fixed calendar was being used, the instance of the Great Rising in the reign of Osorkon II.

The date of Osorkon II. is fortunately exactly known on other grounds by reckoning back from the eclipse[34] of 851 B.C. in the 15th year of Takerat II. As Osorkon II.'s 28th year was the 5th of Takerat II. it follows that his first year was 888-887.

Now the inscriptions in the Festival Hall of Osorkon II. in the Great Temple of Bubastis (FN.) show that in his 22nd year on the 1st of the 4th month he renewed "the divine abode of Amon in the hall of the Sed festival." "We see Bast standing before the king who offers her the

clepsydra, and the text reads: 'He* gives thee Sed periods of (twelve) years each.'" This has reference to the twelve† year cycle of Jupiter, for Osorkon "is sitting exactly in the attitude of Osiris and holds the insignia of that god" (FN. 13). The description of the whole ceremonial shows that it was connected with an exceptional rising of Jupiter (Osiris), and as Naville comments (FN. 10), "the carrying of a sacred emblem out of its shrine in a festival or the solemn apparition of a king in a religious ceremony is compared to the rising of the sun or of a star and is expressed by the same word."

Now the use of the word Sed also implies that the appearance of the visible new moon was close to the date of Rising of Spica. This was invariably the occasion[38] of a Sed Festival throughout the Eighteenth Dynasty and it is only in the Nineteenth Dynasty that we read of rather similar festivals held by Rameses II. on the traditional coronation date of Osiris and quite unrelated to the major lunar cycle.

Other planetary gods were present but took no important part in the ceremony.

The 22nd year of Osorkon II. was 867-866. Spica rose about 25th September 867 B.C.: Jupiter rose about 20th September: the moon became visible about the 23rd September and the first day of the lunar month would accordingly be 23rd, 24th, or 25th September, depending on the estimate made by the priests at the previous full moon and the consequent length assigned by decree to the previous lunar month. It is thus little wonder that Osorkon

* I assume this to mean that Bast (probably Mars) gives the king (representing Jupiter) the Sed Periods. The reason Bast is the giver is because she was the chief god of Bubastis.

† I am informed that the word "twelve" does not occur in the text so that no importance can be attached to the coincidence in the number of years here, Naville being in error.

paid special attention to this festival and ordered the account of it to be recorded. The chance of Jupiter rising in any year within five days of Spica when the new moon was also so close as in this instance is about 1 in 288. Since Osorkon's date is otherwise confirmed by the eclipse in Takerat II.'s reign, the date assigned to him may be regarded as certain.

The circumstance that this date is so exactly known enables us to determine the position of the Sacred Calendar, which was quite different both from the Fixed Calendar starting from Spica and the Wandering Calendar, for the date is given by Osorkon as the 1st day of the 4th month.* In terms of the Wandering Calendar the ceremony took place on the 2nd day of the 7th month (Phamenoth); so it is clear that the date is not quoted in terms of the Wandering Calendar. It must therefore be in terms of the Sacred Calendar. This shows us that in the Sacred Calendar Hathor was the 4th month, and that probably the mean position of 1st Hathor of the lunar calendar coincided with the Rising of Spica. This is confirmed by the fact that the Feast of Hathor (the Rising of Spica) was (ideally) held according to it on the 1st of the 4th month.† This was so at all periods that the use of the religious calendar can be traced; in the period subsequent to the era of Menophres when the 4th month of the Wandering Calendar was Khoiak, in the time of the Eighteenth Dynasty when the 4th month of the Wandering Calendar was Tybi, and in the time of the Twelfth Dynasty when the 4th month of the Wandering Calendar was Rekeh (great). It thus persisted irrespective of changes and reforms in the

* Naville on the assumption that it is the Wandering Calendar reads the month as Khoiak.

† Weill assumes that the 4th month meant Khoiak as in the the latest period of the Wandering Calendar (WC. 122).

Wandering Calendar and its corresponding Fixed Calendar and was probably very ancient.

In this Sacred Calendar the birth of Re-Hor-Khouti (Papyrus Gardiner) or of Re (Edfu Calendar) was celebrated on the 1st day of the 1st month, and several scholars have suggested that this calendar commenced at the Winter Solstice when the Sun as it were was reborn, and appeared afterwards to culminate daily higher and higher in the heavens, having been at its lowest point on the day of the Winter Solstice. This seems to me very probable especially as Sir Flinders Petrie has pointed out* that the hieroglyph for the first season looks much more like "growth months" than "flood season," of the second more like "house months" than "winter," and the third more like "inundation mouths" than "season of absence of water" or "summer." But I apply this theory in quite a different way from Sir Flinders Petrie.

I do not think that at any time in the dynastic period the first season of any fixed calendar corresponded with the period of growth, but that the first season of the Sacred Calendar did so *when the lunar calendar originated.* In other words it originated when the mean date of the 1st day of the 4th month (the Rising of Spica) coincided with the Vernal Equinox, *i.e.*, at the same time that I have shown that the Babylonian calendar originated (MB. 25) (very approximately about 14452 B.C.) and thus as Sir William Peck postulated (MB. 135) the Rising of Spica the "ear of corn" took place near the date of harvest time in Egypt.

My present view is that this original calendar was, like the Babylonian, a lunar calendar with intercalations to keep the months near their ideal position relatively to

* Cf. also the theory of Champollion (BM. 34).

the stars. (The Babylonian first month, however, was that at the Vernal Equinox, not at the Winter Solstice.) But the Babylonians took note of precession and approximately once in every 2160 years adjusted the numbering of their months to correspond with the seasons. The Egyptians did not do so and by the beginning of the 56th century B.C., the 1st day of the 4th month Hathor (still coinciding ideally with the Rising of Spica) occurred some days after the Summer Solstice instead of at the Vernal Equinox, and the first four months of the year no longer corresponded to the period of "growth."

Not only so, but it is extremely unlikely that after the passage of more than 8000 years the "man in the street" would know that Akhit originally meant the growth season, and the then "modern" language would be so entirely different from the language of the ancients that in common speech the word for "growth" would not be the same.

In this state of affairs a reformer appeared on the scene who apparently thought a lunar calendar a most inconvenient thing in business and suggested the 365 day calendar. The business men approved and the king approved and so the new calendar was decreed, and as the zodiac was measured from Spica and it also so happened that the Nile floods then began near the date of Rising of Spica it was thought that the calendar should commence then too instead of three months earlier. Accordingly save in the calendar of the conservative priesthood Hathor became the first month of "Akhit" which to the people was merely a meaningless word understood to signify the "first season." Knowing, however, that the civil calendar was started then because it was the beginning of the flood period Akhit soon became associated in their minds with the Inundation instead of the period of "growth" which it had signified at first.

This equivalence of Akhit with the inundation period in the minds of the people is proved by the fact that on two occasions to counteract the effect of precession the calendar was reformed by one month only, thus in each case bringing the 1st day of the fixed civil calendar back nearer the commencement of the inundation. If they had thought of Akhit then as the "growth" season they would have had to make an alteration of more than six months in their seasonal grouping.

For this reason I cannot follow Sir Flinders Petrie (AE. 1929. 40) in his belief that the Twelfth Dynasty dates are quoted in terms of a seasonal calendar beginning, be it noted, not exactly at the Winter Solstice as his theory would logically require but about December 6th (Julian) = 16th November (Gregorian) from 2500 to 2300 B.C. if, as is his view, Sirius rose on the 16th day of the 8th month (the 226th day of the year, not the 197th as Petrie states by a slip).

At any period there is so little difference between a stellar year and a seasonal year that there is no occasion to keep both. Further it is not a simple thing especially in low latitudes to tell the date of the Winter Solstice. The agricultural labourer would readily observe the rising of a star but if he was asked the exact day when the Sun was at its lowest in the heavens he would wonder what prompted the enquirer to ask him a question so difficult to answer. As (in addition to the civil Wandering Calendar) there already existed the old sacred lunar and fixed calendars commencing three months before the Rising of Spica, and the civil fixed calendar (all convenient seasonal measures though none of them began in the late period at the Winter Solstice) there was no occasion to introduce another seasonal calendar in the dynastic age. It is indeed pretty certain that the date of Rising of the Sothis in the 7th year of

Senousrit III., namely the 16th of the 8th month, was in terms of the Wandering Calendar not a fixed calendar because we have the authority of Thothmes III. that Senousrit celebrated the Festival of the Beginning of the Seasons on the 21st of the 8th month. The Festival of the Beginning of the Seasons was celebrated at the Rising of Jupiter and Saturn close to the Sothis. If the two dates were in terms of a fixed calendar they would both have been more nearly the same. The fact that they are slightly different shows that they are in terms of the Wandering Calendar.

. . . . .

The existence of an ancient calendar beginning with Mesore (Re Hor Khouti) is also shown by Gardiner's examination of dates of feasts (AZ. (1907) xliii. 136ff.) showing their celebration in the appropriate months on the assumption that Mesore was the 1st month. It has, however, been argued that the feasts were celebrated not in the months of which they bore the names but in the month following, this theory being formulated to explain the Ebers Calendar[37] in which to complete the theory it is necessary to suppose that the month names used do not represent the months of the names given but the months in which the feasts of the months of those names were celebrated!

NOTE 54. THE ECLIPSE OF THE MOON IN THE REIGN OF TAKERAT II.

In the annals of the High Priest Osorkon occurs the following statement with reference to the 15th year of Takerat II. (BR. IV . § 764) : " Now afterward in the year 15 fourth month of the third season day 25 under the majesty of his august father the divine ruler of Thebes, before heaven devoured the moon (great) wrath arose in this land like . . . . the hated and the rebels." This seems to indicate that an eclipse of the moon took place shortly after the date stated, 25th Mesore. A total eclipse of the moon took place on the night of 16th-17th March (Julian) 851 B.C. a few days after 25th Mesore which in that year was equivalent to 13th March.

It is probable, therefore, that 13th March 851 B.C. fell in the 15th year of Takerat II.

NOTE 55. THE TWENTY-SECOND DYNASTY.

The knowledge that the Egyptians paid special attention to the risings of the gods makes it possible to fix the chronology of the Twenty-second Dynasty with some approach to precision.

Thus in the 21st year of Sheshonk I. or the following year in the 10th month there was made "a jubilee court for the house of his father* Amon Re" (BR. IV. § 770). Now a jubilee court was normally erected for the rising of the Moon, or one of the planets, when near Spica. But the 10th month of the Sacred Calendar (which was used[58] by Osorkon II. and therefore probably by the other kings of this dynasty for dates of religious ceremonies), extended from the end of March to the end of April, fully six months before the Rising of Spica, so that either it was prepared far in advance in this case or this is the heliacal rising of Jupiter (Amon) near Saturn. Saturn rose just about the beginning of the month on 30th March 920 B.C. close to Jupiter which had risen a few days previously on 25th March. It would be necessary to go back or forward 60 years to find another date when this occurred in the 10th month. If 920 B.C. was in the 21st year of Sheshonk, his first year would begin about 940 B.C.

As the more ordinary meaning of the phrase would apply to the 12 year cycle of Jupiter we may also examine

* In Egyptian hieroglyphs there is no equivalent for our conjunction "and" (BGH. 89), which is understood. "Amon Re" means Amon (Jupiter) and Re (Sun) and refers, therefore, to Jupiter's heliacal rising. Amon and Re are probably not identified as one god as some Egyptologists suppose. Statues of "Amon-Re" no doubt occur, but these may represent Amon on the occasion of his heliacal rising, and not Re at all.

the reference on the assumption that the court was made six months before the ceremony. Now it is known that Sheshonk, King of Egypt, attacked Jerusalem in the 5th year of Rehoboam (I. Kings xiv. and II. Chron. xii.) which is about 933-932 B.C. Therefore that year must have fallen in Sheshonk's reign. Further it was earlier than the 21st year for there is a reference to Sheshonk's triumph in a record supposed to have been made at the time of the ceremony. Therefore the 21st year must have fallen between 933 and 912 B.C. The occasions when Jupiter rose near Spica in that period were in 926 and 914 B.C., but as the recital of the king's deeds would not be likely to extend back further than a 12 year cycle the early date 926 B.C. would be preferable. Jupiter rose about 30th September in that year.

It seems far more likely, however, that it was the important conjunction that was denoted. The date of this king is, owing to the dubious meaning of this ceremony, the least certain of all in the dynasty.

There is fortunately preserved a record of offerings to the gods in the first few years of Osorkon I. (BR. IV. § 733). The first line gives Hathor and Mut, Herishef and Thoth, then on next line Thoth and Bast. Now Mut is known to be Saturn, and Hathor Spica, and the first record would be the special offerings at the festival of Saturn which recurs when it rises near Spica once in 30 years. Harsaphes, if the same as the god on the third line of the Palermo Stone read by Moret as Herishef (by Breasted as Seshat) is probably Mercury, while Bast "was the feminine form of Bes, the warrior god who came from the coasts of Arabia" (SE. 225) and is probably, therefore, a goddess of the planet Mars.*

* There is an Egyptian marble slab showing the twelve signs of the zodiac and an inner circle with twelve corresponding animals (SB. Plate VI.). Opposite Aries, one of the signs of Mars, is a cat. Cats were sacred to Bast.

Thoth is Sirius. If in one year we find a date of Saturn rising near Spica and of Mercury rising near the date of Rising of Sirius, and in the next year Mars rising near Sirius, within a reasonable distance of the probable date of Osorkon I. it is fairly certain to be the date in question. Saturn rose about 1st October 906 B.C. within a few days of the Rising of Spica. Mars rose about 20th July 905 B.C. within a few days of the Rising of Sirius. This sequence of nearest cyclical risings occurs on an average about once in 30×17 years, which equals once in 510 years, and even when the sequence does occur the nearest rising of the cycle would very rarely be as close to the dates of Rising of Sirius and Spica as it is in these two instances. Mercury rose about the evening of 18th July 906 B.C. (close to the date of Rising of Sirius). The first year in the list was probably either the first or second year of Osorkon and we may provisionally regard 906 as his first year.

Takelot II.'s date is fixed by the eclipse[54] and Osorkon II.'s by the knowledge that his 28th year was the 5th of Takelot II., as well as by the evidence from the Festival Hall[55].

The clue to the date of Sheshonq III. is to be found in the record of Offerings (BR. IV. § 770) for in year 25 there were offerings to Amon and Mut, and in year 29 to Amon and Hathor, showing that Jupiter and Saturn rose in conjunction in his 25th year and that Jupiter rose near Spica in his 29th year. The chance of this sequence occurring is $\frac{1}{20 \times 12}$ which equals once in 240 years, but the occurrences are so distributed that it does in fact occur 3 or 4 times at intervals of 60 years and then not again for 7 or 8 centuries.

In 860 B.C. Saturn rose about 17th April and Jupiter about 19th April. In 855 B.C., Jupiter rose on 23rd September, its nearest Rising to Spica in its 12 year cycle. There is a discrepancy here for if April 860 B.C. was in the

25th year then September 855 B.C. would be in the 30th year. The discrepancy may be due to different methods of reckoning, such as from actual accession and from coronation. The phenomena 60 years later tally with no discrepancy, but the date seems too late.* Also the placing here is partly confirmed by the fact that the annual Feast of Amon was in progress (BR. IV. § 777) in the 39th year on the 26th day of a month of the third season. In 846 B.C. Jupiter rose about 30th June. The 26th of the 12th month (sacred) was about 19th June. The festival period would commence some time before the actual rising. We may, therefore, provisionally place the commencement of the reign in 884 B.C.

A rare planetary combination occurred in the 22nd year of Sheshonk IV. (JEA. VI. p. 56) for a stela records an offering to Anubis (Venus) and Osiris (Jupiter) in that year, and offerings for the Ka of the Divine Father, "him who is over the secrets of the shrine of Hathor." The mention of Hathor indicates that this refers to the important period in the planetary cycles when they rose at their nearest to Hathor (Spica). Now Venus has an 8 year cycle and Jupiter a 12 year cycle so that theoretically they would begin their cycles in the same year on an average once in 96 years. This theoretic average would be found to be approximately true if a long period (say 960 years) were examined, for they would in that period only commence their cycles together about 10 times, and the risings would only be really close to each other on 2 or 3 of these occasions. But it so happens that 3 periods of Venus and 2 periods of Jupiter are both approximately equal to 24 years, so that when one year is found when they both begin their cycle together the same phenomenon occurs 3 or 4 times at successive intervals of 24 years and then does not occur again for a long period.

* Owing to the placing of Sheshonk IV.

Sheshonk IV.'s date is approximately known from the fact that he was later than Takerat II. (who is dated by the eclipse of 851 B.C.). On searching the two centuries following Takerat II. the following are found to be the only years when Jupiter and Venus might be both regarded as beginning their cycles in the same year: 843, 819, 795, 771 B.C.

In 747 B.C. Jupiter rose more than a month after Spica and therefore that date is inadmissible. 843 B.C. seems too near to Takerat II. and therefore 819, 795, and 771 B.C. are the only dates to be considered. Spica rose then approximately on 26th September and the dates of rising of the planets were as follows:

	Rising of Venus	*Rising of Jupiter*
819	20th September	7th October
795	14th September	15th October
771	6th September	24th October

It will be seen that though Jupiter rose in fixed Hathor in 795 and 771 the risings were not strictly its nearest risings to Spica in its 12 year cycle. The risings of Venus are in each case its nearest to Spica in its 8 year cycle but by 795 and 771 they have receded some distance and are more than a month from the rising of Jupiter. There seems, therefore, no option but to regard September-October 819 B.C. as falling in the 22nd year of Sheshonq IV., and his first year as 840-839.

We may, therefore, now estimate the dates of the kings of the Twenty-second Dynasty and the portions of reign to which importance was attached by Manetho:

Date	*Total Reign*	*King*	*Reign acc. to Manetho*	*Corresponding Date*
940-906	$21+x$	Sheshonk I.	21	927-906
906-870+	$36+x$	Osorkon I.	15	906-891
891-866+	$25+x$	Takelot I.		
888-860+	$28+x$	Osorkon II.	25	890-865
c. 884	0	Sheshonq II.		
865-840+	25+	Takelot II.	13	865-852
884-831	53	Sheshonk III.		
832-826	$6+x$	Pemou	42	852-810
840-803	$37+x$	Sheshonk IV.		

It will be seen that Manetho's figures give the exact intervals in each case from the commencement of one reign to the commencement of another except for a discrepancy of one year 891-890 which may be due to omission of odd months. He makes the dynasty commence in 927 however in place of 940 and end in 810 in place of 803. He was usually careful to discount coregencies and it may be that the Twenty-first Dynasty extended to about 927 and that the Twenty-third began about 810 thus both overlapping the Twenty-second. The regnal years in Manetho do not tally with the total, 120 years, which from 927 would yield 807 : so the exact date of rise of the Twenty-third Dynasty is uncertain (so far as the above evidence goes).

It may be objected that there were six generations of priests from the reign of Osorkon II. to year 37 of Sheshonk IV. (*i.e.* not more than 85 years at the outside by the above chronology) but adoption was common and, though the steps in descent are shown as in natural succession, some of the priests may have been merely sons by adoption. There were only four generations of kings in the same period (BR. IV. § 694). The chance of all the astronomical evidence tallying so exactly with Manetho as it does is very remote* indeed, and Manetho can therefore not be set aside on grounds of period of descent which is a very much weaker form of evidence in view of the common practice of adoption and consequent uncertainty of interval from one high priest to the next.

. . . . .

Those who use the evidence of generations here, as if they were real generations, to support their chronology censure Herodotus for making use of generations in his

* The actual chance, omitting the doubtful reference in Sheshonq I.'s reign but including the Festival of Osorkon II. is 1 in 510 × 240 × 96 × 288 = 1 in 812,187,648,000. This may be divided by 2 to discount the discrepancy of 1 year.

estimate (II. 142) of Egyptian chronology. If we are consistent we must regard such evidence as equally suspect in the Twenty-second Dynasty and as possibly referring to artificial generations only. Herodotus reckoned 341 generations as 11,340 years. If the true duration of the period referred to (from Menes to Sethos) was as in my chronology slightly over 5,000 years the average interval of succession of " father " and " son " would be between 14 and 15 years. In the Twenty-second Dynasty 6 " generations " in 85 years also implies an average of between 14 and 15 years. The short chronologists, who reckon an interval of c. 2,600 years or even less from Menes to Sethos, require the " generations " of Herodotus to be reckoned at only 7 or 8 years. As Herodotus not only gives the " generations " of the priests of Ptah but mentions 345 generations of Theban priests (II. 143) and that he actually saw the statues of each one, " the custom being for every high-priest during his lifetime to set up his statue in the temple," we may assume that there really was about that number of successive priests.

NOTE 56. THE TWENTY-THIRD DYNASTY.

This dynasty is called by Manetho a dynasty of Tanites. As we have seen[55] his chronology for the Twenty-second Dynasty is amply confirmed by the astronomical evidence, so that though Sheshonk IV. reigned locally till after 810 B.C. we are probably right to accept Manetho's chronology as giving the period of dominance and to regard the Twenty-third Dynasty as becoming dominant about 810 or 809.

After the name of the first king Petoubastis Manetho wrote "In his time the Olympiads began." Few dispute the date 776 B.C. as that of the first Olympiad. It falls in Petoubastis' reign (809-769) according to my chronology. On Breasted's chronology Pedibast did not commence to reign till 745 B.C.

. . . . .

There is only one important astronomical clue in this dynasty—the stela of the southern warrior, Piankhi. The stela shows Amon (Jupiter) enthroned with Mut (Saturn) standing behind. The stela is dated year 21 first month of the first season (BR. IV. § 815) and Piankhi takes advantage of the Festival as was customary to narrate his achievements and in particular records the submission of Osorkon (§ 872). The only occasion at that period when Jupiter rose in the first month of the Wandering Calendar with Saturn not far away was in 778 B.C. when it rose about 12th March, but Saturn was not really close having previously risen about 14th January.

It is probable, therefore, that the reference is to the

first month of the ancient fixed *civil* calendar (which as we shall see[80] was also used in the Twenty-sixth Dynasty) and consequently denotes the Rising of Spica when Jupiter and Saturn were in conjunction near it. This yields the date 760 B.C. when Spica rose about 27th September, Jupiter about 27th September, and Saturn about 16th September. Therefore Osorchon must have submitted in the year 761-60 (which tallies closely with Manetho's chronology) and Piankhi, formerly a local king, now became king of all Egypt.

The name *Zet* applied to the last king of the dynasty may have some reference to the Feast of Zet. In his reign in 741 B.C. occurred a Great Conjunction near the Equinoctial Point. Great importance was attached to this conjunction in Babylonia where a New Era was regarded as commencing (antedated to the beginning of Nabonassar's reign). Zet may be the king " So " to whom Hoshea sent messengers (2 Kings xvii. 4).

NOTE 57. THE TWENTY-FOURTH DYNASTY.

In Africanus' list after the Twenty-fourth Dynasty reference is made to a period of 990 years. It has been woven into a fable in which it is taken to refer to the period subsequent to that date. If, however, it is a total of previous reigns it takes us back from 714 B.C. to 1704 B.C. not far from the beginning of the Eighteenth Dynasty and approximately the date of expulsion of the Hyksos.

NOTE 58. THE TWENTY-FIFTH DYNASTY.

The kings of the Twenty-fifth Dynasty were called Ethiopians by Manetho and he regards the Saites as dominant after the reign of Taharka. An Apis aged 21 in the 20th year of Psammetichus I. (644-3) was recorded as born in the 26th year of Taharka (BR. IV. § 962), which was, therefore, 665-4 (or 664-3). So Taharka's accession must have been in 690 (or 689) B.C. Thus Manetho has, contrary to his usual careful practice, failed to discount about 12 years of the Twenty-sixth Dynasty overlapping the Twenty-fifth.

Tirhakah is mentioned as king of Ethiopia in the Bible (2 Kings xix. 9) in connection with Assyrian invasions of Egypt.

There is an astronomical record from Shabataka's reign of the 5th day of the 9th month (BR. IV. § 887), "When his majesty was crowned as king in the house of Amon, he granted him that he should splendidly appear as Favourite of the Two Goddesses." It is possible that this refers to the symbolical crowning at the annual rising of Jupiter. The 5th of the 9th month in 700 B.C. was 16th October and Jupiter is calculated to have risen on 18th October in that year. The King is often designed as "favourite of the two goddesses," but on this occasion Amon "granted him that he should splendidly appear as Favourite" and the reference may be to the goddesses of the two great planets, for Saturn was close to conjunction in that year having risen about 29th September. Only on two or three occasions in 800 years would Jupiter and

Saturn both begin their cycles in the same year, and on no other such occasion in historic time would Jupiter rise near the 5th of the 9th month. The record is read as year 3 and this tallies with the chronology. The Nile was high at the time, which yields a very approximate check[30] on the date.

The priest Mentehemet records an oblation to Min-Ammon (Jupiter) on the 28th day of the 10th month (BR. IV. § 909) in Taharka's reign. In 663 B.C. that was equivalent to 28th November in the Wandering Calendar. Computation yields about 1st December as the date of rising of Jupiter in that year, so Taharka must still have been ruling over part of Egypt in 663, though Psammetichus was the dominant king.

The victory of Asshurbanipal over the Egyptians is usually placed at about 668 B.C. This is confirmed by one of the omen texts of his Astrologers (TR. xl. 44), " When in Nisan on the first day the Moon appears and a north wind blows, the king of Akkad will be happy. Mercury at sunset has stood within Kumal; it is lucky for the king my lord; the king of Aharru will be slain with the sword. The forces of the king my lord in Egypt . . . will conquer."

In 668 B.C. 1st Nisan fell about 18th April. Eleven days previously Mercury was visible at sunset stationary within 6 degrees of the longitude of Algol (Kumal). There is no other year when it was so between 670 and 666 B.C.

Note 59. THE TWENTY-SIXTH DYNASTY.

The ceremony of adoption of Nitocris took place at Thebes in the 9th year of Psammetichus I. She came "to the house of Amon, that he may receive her and be satisfied with her." The probability is, therefore, that the ceremony took place at the annual Feast of Appearance of Amon (Jupiter). The date of arrival at Thebes was the 14th day of the second month (BR. IV. § 945). This date would be in terms of the old Theban Sacred Calendar in which the fourth month commenced with the Rising of Spica (whereas in the Memphis fixed calendar the first month began with the Rising of Spica). As in the Seventh Century Spica rose about 27th September the 1st of the second month would be about 29th July and the 14th about 11th August. Calculation yields about 6th August as the date of Rising of Jupiter in 655 B.C. The astronomical New Moon of July was on the 21st in that year so that the 1st of the lunar month might be 23rd July, yielding 5th August as the date of arrival in Thebes. Therefore August 655 B.C. may be regarded as in the 9th year of Psammetichus I. whose reign must, therefore, have begun either in 664 or 663 B.C.

Breasted has made a careful study of the lengths of reign in this dynasty based on the ages of the Apis bulls. An Apis died in the 16th year of Necho on the 4th of the 2nd month, having been born in the 53rd year of Psammetichus I. on the 19th of the 2nd month, its age at death being stated as 16 years 7 months 17 days. Hence the total length of Psammetichus' reign was 54 years (BR. IV. § 274) not counting odd months beyond the New Year's Day.

An Apis died on the 12th day of the 8th month in the 12th year of Apries at the age of 17 years 6 months 5 days. As his birth was on the 7th of the 2nd month in the 16th year of Necho the interval from the accession of Necho to that of Apries was 21 years.

Psammetichus II. died in the 7th year of his reign in the first month (BR. IV. § 985). His reign was thus reckoned as 6 years, and therefore that of Nechao 2nd was reckoned as 15. (Enekhnesneferibre was adopted by Nitocris in the first year of Psammetichus II. She arrived at Thebes on the 29th day of the third month of the third season. There is a discrepancy here, for in 593 B.C. Jupiter rose in October. I do not know if it is possible that the length of reign of Psammetichus was really 16 years, 10 being erased in the date of death (§ 988 E) which would thus be in the 17th year. If so his first year would be 604-603. Jupiter rose about 25th December 603 B.C. which would be a few days after the 29th of the 11th month of the Wandering Calendar.)

The stelae of the priest Psamtik record his death in the 27th year of Amasis on the 28th day of the 8th month at the age of 65 years 10 months 2 days, having been born on the 1st of the 11th month in year 1 of Necho 2nd, so that Necho's accession was 40 years before that of Amasis (BR. IV. § 1026). As Necho succeeded in 609, Amasis succeeded in 569, and the period between the death of Psammetichus II. and accession of Amasis (588-569) must have been occupied by the reign of Apries. Breasted assumes that the length of reign of Amasis is known as 44 years and consequently the length of the dynasty as 138. 44 years is the length of the reign of Amasis given by Africanus and if 525 B.C. is regarded as the date of Conquest by the Persians this figure is correct.

There is also some interesting evidence[60] from the dates of introduction of the Apis bulls to Ptah.

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After the name of Nechao 2nd Manetho states " took Jerusalem and carried Joachaz the king captive to Egypt." According to the Biblical account Josiah was slain by Nechao (in 607 B.C.) and was succeeded by Jehoahaz who reigned less than a year. 607 B.C. falls in the reign of Nechao 2nd (609-594).

After the name of Ouaphris Manetho writes " to whom the remainder of the Jews fled when Jerusalem was taken by the Assyrians." Jerusalem was destroyed about 587 B.C. which falls in the reign of Ouaphris (588-569).

Note 60. THE APIS BULLS.

A number of records of dates of birth, dates of introduction to Ptah, dates of death and of burial of Apis bulls have been preserved. It is generally conceded that they were sacred to Osiris and that the spirit of the god was supposed to reside in them. When one bull died it was necessary to find a new one, conforming with the qualifications stipulated by the priests, as soon as possible. It is obvious that the dates of birth and death were outwith man's control, unless the bulls were sacrificed which does not seem to have been the case: but the dates of "introduction to Ptah" might be selected dates. If selected the hypothesis may be put forward that they were connected with the cycle of Osiris (Jupiter). Examination of the dates and computation of the position of Jupiter shows that this was indeed the case, if the dates were in terms of the old Memphis fixed calendar in which the 1st of the 1st month corresponded with the Rising of Spica.

The following are recorded dates of introduction to Ptah with their Julian equivalent.

29th year of Sheshonk III.	1st of 12th month	=22nd August 856 B.C.
26th ,, ,, Taharka	9th of 8th month	= 3rd May 663 B.C.
54th ,, ,, Psammetichus I.	19th of 3rd month	=18th December 609 B.C.
5th ,, ,, Amasis	18th of 10th month	=11th July (561 B.C.)

Calculation yields *c.* 25th August 856 B.C. as the date of heliacal rising of Jupiter; 3rd May 663 B.C. and 20th December 609 B.C. as dates of opposition to the Sun. These three dates tally closely with the dates of the first three kings otherwise obtained and we may therefore assume that after the bull was found it was "introduced to

Ptah " on the first occasion afterwards when either Jupiter rose heliacally or was in opposition. The date given in Amasis' reign does not tally for his 5th year of rule over all Egypt, but he may have been part ruler earlier. Jupiter rose about 9th July in 561 B.C. placing the beginning of Amasis' first year on this method of reckoning in 566 or 565 B.C. As Apries died in Amasis' third year dated from his accession as coregent, this date is reckoned the 5th year from Apries' death and the commencement of Amasis' sole reign.

NOTE 61. THE FEAST OF PTAH-SOKAR AND THE ISIDIA.

The Feast of Sokar usually occupied about 19 days of the 4th month or commenced in the 4th month. It was specially important on occasions when it coincided with an Osiris Festival, and then designated as the Feast of Ptah-Sokar-Osiris, usually understood to signify that Sokar was identical with Osiris, whereas Osiris was Jupiter and Sokar, as I hope to show, was Mercury-Isis.

Now Ptah was regarded as the ruler of the month Menkhet (Paophi) (BM. 53) and the stars of Virgo rose heliacally in fixed Menkhet. The Greeks identified Ptah with Hephaestus and the Romans in their turn identified Hephaestus with Vulcan. In the Colotiannus and Valleuse zodiacs Vulcan is assigned to Virgo though in another it is assigned to Libra (HM. II. xvi.).

The Volcanalia, the principal Roman Festival in honour of Vulcan, was held on 23rd August. In the original Latin lunar calendar (of 12 months, not 10 as stated* by M. Fulvius Nobilior) the ideal March would coincide with the rising of the stars of Aries and thus the ideal Sextilis (afterwards called August) with the rising of the stars of Virgo. Owing to irregularities in intercalation either when the lunar calendar was in use, or in the Republican calendar, by Caesar's time 1st September no longer coincided with the Rising of Spica which then rose by the Julian calendar on October 2nd. (In one old

* After the introduction of months of fixed lengths at Alba Longa, it is possible that only ten were numbered, the remaining two being named. Later some of the ten were also named either at Alba Longa or Rome.

Roman calendar, however, the rising of Arcturus was stated as occurring on 12th September and of Spica on 18th September.)

The Attic Festival of Apaturia in honour of Athena and Hephaestus was held in the month Pyanepsion which like the Roman calendar was (in the Metonic cycle) no longer in its original position but corresponded roughly with October when Libra rose.

Though fixed Menkhet was the month when Virgo rose it does not necessarily follow that the constellation with which Ptah was connected was Virgo. It may have been the much more prominent constellation Bootes which rose about the same time (Arcturus rose 8 days before Spica in 1 B.C., 18 days before Spica in 3000 B.C.). The attitude of the figure ruling the last month (Menkhet) in the calendar of Aseth rather favours this view. According to one legend, Bootes represents Icarius who was killed by some shepherds. Jupiter, taking pity on his mourning daughter Erigone and their dog Maera, placed Icarius in heaven as Bootes, Erigone as Virgo, and Maera as Canis Minor. The planet associated with Arcturus is Jupiter, and thus we find in the Apis bull festivals[80] that the dates of introduction to Ptah were significant in connection with Jupiter's cycle.

The figures of Ptah on the zodiacs bear some resemblance to the Syrian lightning god Resheph, the Hittite Teshub, and to some Minoan and Mycenaean bronze figurines. In similar figures from the Cappadocian regions "the god often holds a thunderbolt and at times a double axe, anticipatory of Jupiter Dolichenus" (EP. iii. 479).

At Kition the Phoenician king appears, however, to have identified Reshef with Apollo of Amyklae (EP. iii. 480). But this Reshef Mikal was evidently worshipped at the season of year when Bootes and Virgo rose for

Mikal's Alexandrian temple (founded by Cleopatra) was "re-consecrated by the Patriarch Alexander about the time of the First Council of Nicaea, as a church of the Archangel Michael" (*loc. cit.*).

Now the dedication feast of the cult of St. Michael at Rome was on 29th September in Virgo's month, a few days before the Rising of Spica, the beginning of the Scales. "St. Michael weighing the souls of the dead in a balance is the most important figure in medieval scenes of the last Judgment" (AE. 1930. 117).

While Ptah possibly refers to Bootes, and Osiris to Jupiter, Sokar seems to refer to Mercury, for Feasts of Sokar are recorded on the Palermo Stone[5] at intervals of six years. No planet other than Mercury has a six year cycle.

This identification is further rendered probable from the nature and duration of the ceremonies at the Feasts of Sokar. They lasted about 19 days. As it so happens in the examples which have come down the date in several instances was from about the 12th to the 30th of the 4th month. The "lamentations" which formed part of the ritual took place about the 24th to 30th (WC. 140). In the ritual texts the whole ceremonial is descriptive of death and resurrection and in the cycle of a planet that is obviously analogous to its disappearance in the light of the Sun and reappearance again after an interval. The periods stated, which vary from 18 to 22 days, are about the period of Mercury's invisibility when it happens to occur in any of the months from September to February (though it is only about 14 days at the Winter Solstice). The period of no other planet tallies even approximately.

In the Edfu Calendar which other evidence seems to indicate is in terms of the ancient Sacred Calendar, the ceremony took place in the 4th month, fixed Hathor.

Plutarch also refers to the Isidia as taking place in Athyr, though in his time Athyr of the Alexandrian Calendar is meant. We also find it celebrated in Athyr of the Wandering Calendar in the Ptolemaic period, for Geminos writing about* 50 B.C. (WC. 143) said (Εἰσαγωγή Ch. 8) that 120 years before him the Feast of Isis fell at the Winter Solstice, while at his own period the same festival was one whole month before the solstice. Calculation shows that 120 years before the time of Geminos the solstice fell in Athyr of the Wandering Calendar, which naturally changed exactly 30 days in terms of the Julian Calendar in 120 years†. Isis is definitely known to be Mercury from the Era Horoscopes in the Ramesseum[88] and from the Athribis Horoscopes.[89] As the ceremonies at the Isidia were identical with those at the Feast of Sokar this is a further piece of evidence that Sokar is Mercury.

(The astronomical evidence suggests that Geminos was referring to a ceremony in 56 B.C. when Mercury set on 22nd November and rose on 6th December, the solstice being on 24th December (Julian). 120 years before that, 176 B.C., the solstice was on 25th December, while Mercury was last seen on 19th December and rose on 1st January.)

Though the correct month for the ceremony was Hathor, when the Greeks revived the study of the ancient Egyptian Calendar they and their native Egyptian advisers did not at first realise this and thought that the fourth month was Khoiak which was, of course, the fourth month of the Wandering Calendar in Ptolemaic times. Accordingly we find that the Greek Calendar of Hibeb (WC. 184)

* The exact date of Geminos is, however, uncertain. See Lewis' *Astronomy of the Ancients*, 1862, p. 217.

† Geminos quoted Eratosthenes as having said that the Isidia were once celebrated at the Summer Solstice. When the Wandering Calendar originated the rising of Ptah (Bootes) was complete about the time of the Summer Solstice, and the month Hathor was very soon after it.

which shows the autumnal equinox (then 27th September) on 23rd Epiphi and thus can be dated at about 313-310 B.C., shows the navigation of Osiris on 26th Khoiak, and in the Esneh Calendar of 118 B.C. the same mistake is made. As the error was corrected later it looks as if Geminos' statement in regard to the ceremony 120 years before his time was based on his calculations and not on a record.

It is possible that the ceremony eventually became an annual commemorative ceremony and bore no reference to the planetary cycles, though a Ptah-Sokar-Osiris Festival would originally only be held on the rare occasions when the Mercury and Jupiter Festivals coincided in fixed Hathor. (It is strange that they were not held in Ptah's own month Menkhet, but in the following month when Bootes was higher in the sky at sunrise.)

In one account of the Isidia Plutarch gets a little confused giving the 7th Tybi as the day of "return of Isis of Phoenicia," and 17th Athyr as the date of commencement of the ceremonial. This might be so at one particular period. Thus about 107 A.D. 7th Tybi of the Wandering Calendar would be equivalent to 1st December while 17th Athyr must have been in terms of the Alexandrian Calendar, equivalent to 13th November, and yielding an interval of about 18 days.

Note 62. ASTRONOMICAL EVIDENCE FROM PTOLEMY.

Claudius Ptolemy writing in the second century A.D., deals with astronomical observations made long before his time, and evidently had access to Chaldæan records. He gives the dates of some astronomical phenomena in terms of the Babylonian Calendar for the earlier period and in terms of the Seleucid Calendar (the Macedonian Calendar in the form used in Chaldæa but not in the form used in Egypt) for the later period and some in terms of the Egyptian Wandering Year and some in terms of both calendars. It may be that the original recorder used both dates and if so the records are very valuable as a check on the position of the Wandering Calendar at the date to which they refer. It is possible, however, that the original recorder only used the Seleucid date, and that the Egyptian date is the date computed by Ptolemy himself from the data supplied. In the latter case the records show us the position in which Ptolemy supposed that the Wandering Calendar then was and are not quite so valuable as contemporary evidence would have been.

The first records of use to us are those of eclipses of the Moon, of which one occurred in the first year of Mardokempados on the night of 29th to 30th Thoth. It began in Babylon "fully an hour after the rising of the Moon and was total." This is the often quoted eclipse of 19th March 721 B.C. and thus gives us the equation 29th Thoth = 19th March for that year.

The second eclipse occurred in the following year the

night of 18th to 19th Thoth corresponding to the night of 8th to 9th March 720 B.C., and the third in the same year on 15th Phamenoth, 1st September.

There is also a reference to the conjunction of Mercury with a northern star of Scorpio on 5th Apellaios 67th Chaldæan year in the night of 27th to 28th Thoth in the 504th year* of Nabonassar (245 B.C.). Since the Seleucid months were lunar months it follows that 1st Apellaios must have been near the date of the visible New Moon. The astronomical New Moon of 245 B.C. was on 13th November at 1.17 a.m. Babylon Mean Time (GH. iii. 2) so 1st Apellaios may have been about 14th November, giving approximately 18th November as 5th Apellaios or 27th Thoth. Reckoning from the eclipse dates 27th Thoth should theoretically equal 18th November in that year.

Ptolemy also gives us a double date, 14th Dios equals the night of 9th to 10th Thoth of the 512th year of Nabonassar (237 B.C.). This was a few years before the decree of Ptolemy III. Euergetes whereby 1st Payni was kept coincident with the Rising of Sirius in the North. It was coincident also in this year so that 9th Thoth then equalled 29th October and therefore 1st Dios equalled 16th/17th October. The astronomical New Moon was on 15th October at 9.56 p.m. and would not be visible till the 16th or 17th.

Finally Ptolemy gives us the date of a digression of Saturn on the southern shoulder of Virgo the 5th Xanthicus 82nd Chaldæan year, 14th Tybi of the 519th year of Nabonassar (230-229). 14th Tybi was then equivalent to 2nd March (229 being the Julian leap year but possibly not Euergetes' leap year) yielding 27th February for 1st

* The 504th year measured in Julian years would be February 244 to February 243 B.C. but in the Egyptian year measured from Thoth it began on 23rd October 245 B.C.

Xanthicus. The astronomical New Moon was on 24th February 229 B.C. 11.8 a.m. and would probably be visible on 25th February, but the 1st of the month would not necessarily always be exactly the day of visibility.

. . . . .

From the astronomical clues given Ptolemy makes clear to what dates he assigns the successors of Alexander in Egypt. He reckons their regnal years from 1st Thoth in each case and not from the actual date of accession. The years deduced from his Canon are (GH. i. 138 and BG. 166) :

	Reign	
Philip Arrhidaeos	7	B.C. 324-317
Alexander II.	12	317-305
Ptolemy Soter	20	305-285
Philadelphos	38	285-247
Euergetes	25	247-222
Philopator	17	222-205
Epiphanes	24	205-181
Philometor	35	181-146
Euergetes II.	29	146-117
Soter II.	36	117-81
Dionysos Neos	29	81-52
Cleopatra	22	52-30

Contemporary astronomical evidence and other facts[88] show that in some cases the kings reckoned their accession as taking place in a different year from that assigned by Ptolemy.

NOTE 63. THE TIMES OF ALEXANDER AND THE PTOLEMIES.

The periods of reign in Egypt of Alexander and the Ptolemies are determined approximately by the Canon[63] of Ptolemy the astronomer, compiled by him in the Second Century A.D. He does not give the exact date of accession of each king but reckons every regnal year from 1st Thoth, and the year which he gives is not always the same as that deducible from the contemporary evidence,[65] dates given in terms both of the Macedonian lunar calendar and the Egyptian Wandering Calendar. Where there is a difference the contemporary evidence is naturally to be preferred.

In addition to the astronomical evidence from New Moons there are some incidents which may have an astronomical significance and a bearing on chronological questions.

Alexander the Great conquered Egypt towards the end of 332 and visited the oasis of Siwah to worship Amon (Jupiter). One wonders whether he did this at the annual feast of its rising which occurred about 30th October in that year. Most writers, however, place the visit in the spring of 331 B.C., which is perhaps more probable.

Syncellus (Vol. i., p. 389, Bonn ed.), says that Claudius Ptolemy discussed certain astronomical data extending back for a period of 1476 years from the death of Alexander. Alexander died in 323 B.C. and 1476 Egyptian years would carry us back to 1798 B.C., a few years beyond the year of the Era of Nubti 1793 or 1792 B.C.[35]

Ptolemy Philadelphos began to reign about May-June

285 B.C. In honour of Ptolemy Soter a four-yearly festival was instituted. The first fell about June-July, and conceivably may have been held on 28th June 278 B.C., the date of morning rising of Venus (Horus-Apollo) which would rise again close to the same date 8 years later, and so on for a number of periods of 8 years. The other celebrations would be half-cycle celebrations. During his life Ptolemy Soter had paid particular attention to the worship of Horus. (The Greeks paid particular attention to midsummer as is evidenced by the summer celebration of the Olympian and other Games.)

The Pythian Games were instituted in 595 B.C. in honour of Apollo (Horus=the god of the planet Venus). (Helios was the Sun god and it was only in the very late period that Apollo became identified with the Sun.) In that year Venus' morning rising occurred on 18th July Julian=12th July Gregorian, its nearest morning rising to the Summer Solstice in its 8 year cycle. In later times the celebration would continue to be held every 8th year though the origin of the cycle was forgotten, and the risings no longer corresponded.

Ptolemy III. Euergetes I. built a temple at Edfu to Horus. The foundation was laid in the presence of the king in his 10th year on 7th Epiphi (BE. 216). His regnal years were reckoned by several different methods,[69] his first financial year being reckoned from March 246 B.C. If this date was in terms of the financial year* it is equivalent to 23rd August 237 B.C., the exact date of the morning rising of Venus in that year. As the morning rising of Venus occurs once in 583 days the coincidence is interesting, especially as it is also the date of rising nearest to Spica in the cycle. (His 10th year of sole reign however would be 234 B.C.)

* Which may also have been the ceremonial year.

The stone discovered at Rosetta by the French in 1799, famous as the stone which first gave the clue to the ancient Egyptian language, was dated in the 9th year of Epiphanes 4th Xanthikos, 18th Mechir, yielding the date 3rd April 194. The occasion was a Synod of Egyptian priests. The king is designated as "lord of the thirty year feasts" in the decree written on the stone. This does not appear to refer to the Sed Festival[18] of the type held in the time of the Eighteenth Dynasty and earlier at the Rising of Spica coincident with the New Moon, nor to the Zet Festival at the rising of Jupiter and Saturn in conjunction, but to the Feasts of Saturn which has a 30 year cycle. Saturn on 3rd April 194 B.C. was still visible above the Western horizon just before the Sun rose in the East. Its opposition with the Sun took place on 7th May.

A stone discovered at Damanhur shows that a Synod conducting a similar ceremony met in Epiphanes' 23rd year on 24th Pharmuthi = 4th June 179. That was the exact date of rising of Saturn in that year.

Ptolemy Euergetes II. conducted a special festival (BL.) "In this year 3 the 3rd month of the season of heat the 15th day." But the regnal years were not reckoned from Euergetes' accession but from Cleopatra's so that the year 3 is impossible and the reading may be 23, which would in fact be 145 B.C. Jupiter rose in conjunction with Saturn on 7th August (Saturn having already risen on the 3rd) in that year tallying closely with the date 15th Epiphi. (8th August in south, 15th August in north.)

In the reign of Ptolemy VIII. we learn of an endowment of the temple of the crocodile god Sebek in November in one year and of *epheboi* dedicating their *topos* to Sebek on 3rd April and 10th April of other years. Now Sebek was sacred to Set (Mars), the planet Mars sometimes being referred

to as the star of Sebek, but here a star or constellation is referred to, most probably $\eta\ \zeta\ \epsilon\ \delta$ Ophiuchi which lie in the same longitude as the sign of the Constellation Scorpio, one of the two signs of Mars. η Ophiuchi is still known as Sabik (though it is assumed that the name is of Arabian origin meaning Preceding One). Sabik rose heliacally in November and rose cosmically about April or May.

The coronation of Ptolemy XI. was delayed till his 5th regnal year (75-74 B.C.). The priest who conducted the ceremony narrates on his sepulchral stele (BE. 347) "I gave instruction for the consecration of the Horus (the king as divine) at the time of the birth of the god in the Golden House." Glanville supposes that this means the birth of the Sun god at the Vernal Equinox, but Horus when used without qualification nearly always signifies Venus, and its "birth" indicates the beginning of its cycle at its nearest rising to Spica. Venus rose on 17th September 74 B.C., which was its nearest morning rising to Spica in its 8 year cycle, and the first occasion it so rose after the accession of Ptolemy XI.

In his 25th year (55-54 B.C.) he completed (BE. 354) the Ptolemaic temple of Edfu dedicated to Horus (Venus) by putting up the bronze covered doors in the entrance pylon on Choiak 1 (12th December, by Northern Calendar). The evening rising of Venus occurred on 24th November in 55 B.C.

NOTE 64. THE REFORM OF PTOLEMY III. EUERGETES I.

Ptolemy III. Euergetes I. who was probably assumed as coregent with his father in November 246 B.C. but began his sole reign in February 244 B.C., his first year according to one method of reckoning being dated from the 1st Mechir following (the beginning of the financial year) so that his ninth year on that basis ended in March 235. The examination of New Moons[66] renders it probable that this was the year in which Euergetes promulgated through his priests his famous Decree on 7th Apellaios=17th Tybi= 6th March 235.

The Decree is now known as the Decree of Canopus. The stele on which it is inscribed in Hieroglyphics, Greek, and Demotic, was discovered on April 15th 1866 by a party of German savants (BB. XIX. 1) on the site of the ancient Tanis. The Decree after narrating the good deeds of Ptolemy and his Queen decreed that various honours should be paid to them, including a special festival described in the Greek text as follows (BB. XIX. 167):

". . . a general festival and procession shall be celebrated each year, both in the temples and by the people throughout all the country to King Ptolemy and Queen Berenice, the Good-doing Gods, on the day whereon the star of Isis riseth which, according to the holy books, is regarded as the New Year and is now kept in the ninth year, on the first day of the month Payni, whereon the Greater and Lesser Festivals of Bubastis are celebrated, and the garnering of the fruit, and the rise of the River

takes place; but though it shall fall out that the rising of the star shall, in the course of four years, change to another day the festival and procession shall not be changed, but they shall be celebrated on the first day of Payni, even as they were celebrated originally on that day in the ninth year; and the festival shall last for five days, and crowns shall be worn, and sacrifices and libations shall be made and whatsoever ought to be done shall be done.

"And that the seasons of the year may coincide wholly with the present settlement of the world, and that it may not happen that some of the popular festivals which ought to be held in the winter come to be celebrated in the summer owing to the star changing one day in the course of four years, and that festivals which are now kept in the summer come to be celebrated in the winter in times to come, even as hath formerly happened and would happen at the present time if the year continued to consist of three hundred and sixty days, and the five additional days which it is customary to add thereto: from this time onwards one day, a festival of the Good-doing Gods, shall be added every four years to the five additional days before the New Year, so that all may know that the error of deficiency which existed formerly in respect of the arrangements of the seasons, and of the year, and of the views usually believed concerning the general ordering of the heavens hath been rectified and filled up satisfactorily by the Good-doing Gods. . . . ."

Thus we learn that in the year in question 1st Payni coincided with the Rising of Sirius and that Ptolemy (anticipating the later Julian and Alexandrian calendars) decreed that it should be kept in that position by the insertion of an extra day once in four years. Reckoning forward from the astronomer Ptolemy's eclipse of 721 B.C. we find that 1st Payni of the Wandering Calendar coincided with 18th July (Julian) from 237 to 234 B.C. In 237, 236,

and 235 B.C. Sirius rose probably on that date, and thus the year 235 (indicated by the New Moon equation) tallies.

The other New Moon evidence[63] indicates that the Reform was probably effective at least in the North for about 7 intercalations, though South Egypt may have continued to use the Wandering Calendar.

NOTE 65. EVIDENCE FROM MACEDONIAN DATES.

The original Macedonian calendar was a lunar calendar and checks of the position of the Egyptian Wandering Year can be obtained if a date is expressed in terms of the Macedonian calendar as well as the Egyptian calendar. The check is only approximate for the 1st of the lunar month did not necessarily correspond exactly with the day of appearance of the lunar crescent.

The Macedonian calendar came into use in Egypt after Alexander's conquest and quite a number of double dates are preserved. From these it is evident that intercalation was irregular but that at first roughly 4 intercalations were made in every period of 8 years, so that the months in any given octaeteris fell one month later in the Julian calendar than in the previous octaeteris. Eventually, however, the lunar calendar was abandoned and the Macedonian month names were used for the 30 day months of the Egyptian calendar.

The following were the correspondences in the late period:

Macedonian Months	*Egyptian Months*			
Dystros	Tybi			
Xanthikos	Mechir	(TB. I. (TB. II.	No. 25) No. 397)	B.C. 117 A.D. 198
Artemisios	Phamenoth	(FT.	No. 89)	A.D. 9
Desius	Pharmuthi	(FT.	No. 346)	A.D. 171
Panēmos	Pachons			
Lōos	Payni			
Gorpiaios	Epiphi	(TB. II.	No. 383)	A.D. 46
Hyperberetaios	Mesore	(OP. II.	No. 380)	A.D. 79
Dios	Thoth	(FT.	No. 236)	c.B.C. 61-52
Apellaios	Phaophi	(TB. II.	No. 393)	A.D. 150
Audynaios	Athyr			
Peritios	Choiak	(OP. II.	No. 236)	B.C. 64

It is quite evident that in the late period the months were no longer lunar months but exact equivalents of the Egyptian months of 30 days each, for the date of the Macedonian month stated is always exactly the same as that of its equivalent Egyptian month. Of course, if there was one example only this might be mere coincidence and the example from B.C. 117 may really be lunar. That in B.C. 64 cannot be lunar, however, for the lunar cycle took about 100 years, and if the lunar calendar had remained in force from B.C. 117 to B.C. 64 Peritios would not have corresponded to Choiak in the latter year. On the other hand we have definite evidence that not long before 117 the calendar was lunar, so that we may place the abandonment of the Macedonian lunar calendar at a date either shortly before 117 or within 8 years after that date (when the lunar months approximately corresponded with the Egyptian months with which they were afterwards equated).

Quite a number of double dates between the Macedonian lunar calendar and the Egyptian calendar are preserved, though in many of these cases unfortunately the king's name and year of reign are indistinct.

The following are prior to the Reform[64] of Ptolemy III. Euergetes I. (GH. iii. 11 and BG. 30):

No. 1	9 Philadelphos (or Philometor)	1 or 30 Hyperberetaios	= 7 Pharmuthi	= 19th June 277
No. 2	22 Philadelphos	14 Mechir	= Xanthikos (doubtful)	
No. 3	22 Philadelphos	19 Lôos	= 12 Epiphi	= 4th Sept. 264
No. 4	27 Philadelphos	Gorpiaios	= Mesore	
		and Dystros	= Mechir	
No. 5	29 Philadelphos	23 Artemisios	= 30 Pharmuthi	= 22nd June 257
No. 6	do.	8 Hyperb:	= 9 Thoth	= 3rd Nov. 257
No. 7	do.	12 Hyperb:	= 13 Thoth	= 7th Nov. 257
No. 8	do.	20 Hyperb:	= 21 Thoth	= 15th Nov. 257
No. 9	do.	23 Hyperb:	= 24 Thoth	= 18th Nov. 257
No. 10	do.	13 Apell:	= 13 Athyr	= 6th Jan. 256
No. 11	do.	24 Audyn:	= 24 Choiak	= 16th Feb. 256
No. 12	do.	29 Perit:	= 29 Tybi	= 23rd March 256
No. 13	do.	1 Dystr:	= 1 Pham:	= 24th April 256
No. 14	do.	9 Dystr:	= 9 Pham:	= 2nd May 256

No. 15	29 Philadelphos	18 Dystr:	=18 Pham:	=11th May 256
No. 16	30 Philadelphos	10 Artemis:	= 9 Pachon	=10th July 256
No. 17	do.	3 Dios	=23 Phaophi	=17th Dec. 256
No. 18	do.	13 Dios	= 3 Athyr	=27th Dec. 256
No. 19	31 Philadelphos	2 Daisios	=18 Pachon	=10th July 255
No. 20	do.	16 Daisios	= 2 Payni	=24th July 255
No. 21	do.	28 Perit: II.	= 6 Pham:	=29th April 254
No. 22	do.	20 Dystros	=27 Pham:	=20th May 254
No. 23	do.	22 Dystros	=29 Pham:	=22nd May 254
No. 24	do.	23 Dystros	=30 Pham:	=23rd May 254
No. 25	32 Philadelphos	25 Hyperb:	=25 Phaophi	=19th Dec. 254
No. 26	34 Philadelphos	1 Dios	= 8 Athyr	=31st Dec. 252
No. 27	do.	22 Dios	=29 Athyr	=21st Jan. 251
No. 28	35 Philadelphos	29 Hyperb:	=29 Phaophi	=22nd Dec. 251
No. 29	36 Philadelphos (?)	23 Artem:	=22 Pachon	=13th July 250
No. 30	37 Philadelphos	9 Hyperb:	=16 Phaophi	= 8th Dec. 249
No. 31	5 Euergetes I.	25 Dios	=13 Choiak	= 2nd Feb. 241
No. 32	8 Euergetes I.	2 Gorpiaios	= 7 Phaophi	=27th Nov. 238
No. 33	9 Euergetes I.	7 Apellaios	=17 Tybi	= 6th March 235

In these the month or day of the month is doubtful or unknown in Nos. 1, 2, and 4. In the other cases they are clear and Beloch has shown that the theoretical Julian equivalents for the Egyptian dates in the reign of Philadelphos tally very well with the Macedonian dates on the assumption that the first day of each of the Macedonian months coincided approximately with the day of visible New Moon, the date in the 36th year being the only exception. The double date attributed to that year yields 1st Artemisios=30th Pharmuthi=21st June whereas the astronomical New Moon was on 13th June. The name, however, is indistinct on the papyrus and this date may not belong to the reign of Philadelphos at all. The other evidence is sufficient to give an approximate check on the position of the Wandering Calendar and to prove that Philadelphos reckoned his reign as beginning about May-June 285 B.C.

As regards Euergetes I. Ginzel made the following deductions:

5 Euergetes I.	1 Dios = 9th Jan. 242	but visible New Moon 20th Jan.
8 Euergetes I.	1 Gorp: =26th Nov. 240	but visible New Moon 19th Nov.
9 Euergetes I.	1 Apell: = 1st March 238	but visible New Moon 7th March

Beloch deduced as follows:

8 Euergetes I.	1 Gorp: = 26th Nov. 239	but Astr.	New	Moon 5th Dec.
9 Euergetes I.	1 Apell: = 1st March 238	but Astr.	New	Moon 5th March

It will be seen that in all these cases there are considerable discrepancies between the 1st of the Macedonian month and the calculated New Moon date. We can, therefore, only conclude either that the Egyptian days from which the data is derived were not in the positions assumed or that the years examined are not the correct years. But the evidence from Philadelphos' reign showed that there was no great discrepancy between the theoretical position and actual position of the Wandering Year a few years previously, and further we know from the very inscription of the 9th year with which we are dealing that 1st Payni corresponded with the Rising of Sirius, so the years examined must be wrong. Accordingly I equate as follows, yielding the results stated in Nos. 31, 32, and 33.

5 Euergetes	1 Dios	= 9th Jan. 241	Astr. New Moon 8th Jan.
8 Euergetes	1 Gorp:	= 26th Nov. 238	Astr. New Moon 25th Nov.
9 Euergetes	1 Apell:	= 28th Feb. 235	Astr. New Moon 1st March

It is obvious that the date of the 9th year is the 9th year by a different system of reckoning from the 5th and 8th for in 237 B.C. the 9th year in sequence the astronomical New Moon was on 22nd February. It is agreed that Euergetes was for a time coregent with his father. Meyer (*Untersuch.* 33) places the date of his being assumed as coregent in November 247 and the death of Philadelphos in January 245.

Some inscriptions according to Meyer appear to refer to 27th or 28th Lōos as the date of accession and others to 25th Dios. I accept Meyer's conclusion that 27th or 28th Lōos is the date of adoption as coregent and 25th Dios the date of death of Philadelphos but place the former in 246 B.C. (November) and the latter in 244 B.C. (February).

The Egyptian financial year began on 1st Mechir which in 246 B.C. was equivalent to 23rd March. Ptolemy in his canon (perhaps working from some record of financial years but converting to his own method of reckoning from the 1st Thoth) places the beginning of Euergetes' reign on 1st Thoth 247 B.C. On the supposition that the first two double dates above are reckoned from Euergetes' assumption as coregent and the third from the death of his father, all tally closely with the New Moons.

We may now proceed to examine the remaining dates in Euergetes' reign on the assumption that the Decree of Canopus[64] was effective and that 1st Payni remained coincident with 18th July (Julian) the date of Rising of Sirius in 237-5 B.C. (perhaps sometimes 19th July, depending on the precise year of the tetraeteris when the extra day was inserted). The equations obtained on this basis are as follows:

16th	year (probably of Euergetes I.)	4 Gorp:	=11 Choiak	=28th Jan. 229
21st	Euergetes I.	16 Dystros	=19 Payni	= 5th Aug. 224
25th	(possibly of Euergetes)	11th or 10th Apell:	= 6 Pharm:	=24th May 220
25th	Euergetes I.	26 Lôos	=13 Choiak	=30th Jan. 219

Thus 1 Gorp:	=25th Jan. 229	Astr. New Moon 25th Jan.
1 Dystros	=21st July 224	Astr. New Moon 24th July
1 Apell:	=14th May 220	Astr. New Moon 13th May
1 Lôos	= 5th Jan. 219	Astr. New Moon 4th Jan.

The 25th year dates are apparently like the 9th year date reckoned from the death of his father. The 21st year date does not tally well on my solution. On Ginzel's and Beloch's solutions it is the only date which tallies. The 16th year may be reckoned from the Egyptian New Year's Day following his accession as coregent.

Beloch's analysis is as follows:

1 Gorp:	= 8 Choiak	=25th Jan. 231	Astr. New Moon 17th Jan.
1 Dystros	=14 Pachon	=19th June 226	Astr. New Moon 18th June
1 Apell:	=27 Pham:	=10th May 222	Astr. New Moon 6th May
1 Lôos	=18 Athyr	= 3rd Jan. 221	Astr. New Moon 28th Dec.

In spite of an average difference in three of the examples of over 5 days between astronomical New Moon and the 1st of the month (about 4 days from visible New Moon) Beloch remarks that the reduction of the dates shows that no notice was taken of Ptolemy's Reform. It is possible that no notice was taken of it but the New Moon evidence does not favour that conclusion.

Having checked the position in the time of Euergetes we may now examine double dates of later reigns. They are as follows with my own Julian equation.

No. 1	1 Philopator	28 Gorp:	=12 Tybi	=28th Feb. 219
No. 2	do.	30 Gorp:	=13 Tybi	= 1st Mar. 219
No. 3	4 Philopator	3 Dios	=24 Phamenoth	=11th May 217
No. 4	4 (?5) do.	27 Daisios	=29 Athyr	=17th Jan. 215
No. 5	5 Philopator	1 Artem:	= 1 Phaophi	=20th Nov. 216
No. 6	5 (?6) do.	7 Apell:	= 7 Pachon	=24th June 215
No. 7	9 Philopator	30 or 1 Hyperb:	= 7 Pharm:	=25th May 212
No. 8	9 Epiphanes	4 Xanthikos	=18 Mechir	= 3rd April 194
No. 9	18 Epiphanes	15 Audyn:	=15 Epiphi	=25th Aug. 185
No. 10	23 Epiphanes	24 Gorp:	=24 Pharm:	= 4th June 179
No. 11	24 Epiphanes	28 Dystros	=28 Thoth	=10th Nov. 179
No. 12	5 Philometor	7 Artemis:	= 7 Athyr	=18th Dec. 175
No. 13	8 Philometor	13 Lōos	=13 Mechir	=23rd Mar. 173
No. 14	16 Philometor	19 Apell:	=19 Payni	=25th July 163
No. 15	18 Philometor	4 Perit:	=25 Mesore	=29th Sept. 162
No. 16	26 Philometor	4 (or 30) Xanth:	=25 Thoth	= 1st Nov. 154

The New Moons nearest to the first of the Macedonian months are as follows :

1 Gorp:	= 1st Feb. 219	Astr. New Moon	2nd Feb.
	or=31st Jan. 219 if No. 2 is right and No. 1 a scribal error.		
1 Dios	= 9th May 217	Astr. New Moon	9th May
1 Daisios	=22nd Dec. 216	do.	22nd Dec.
1 Artem:	=20th Nov. 216	do.	22nd Nov.
1 Apell:	=18th June 215	do.	16th June
1 Hyperb:	=26th April 212	do.	15th April
1 Xanthikos	=31st March 194	do.	28th March
1 Audyn:	=11th Aug. 185	do.	12th Aug.
1 Gorp:	=12th May 179	do.	11th May
1 Dystros	=14th Oct. 179	do.	4th Oct.
1 Artem:	=12th Dec. 175	do.	18th Dec.
1 Lōos	=11th Mar. 171	do.	13th Mar.
1 Apell:	= 7th July 163	do.	10th July
1 Perit:	=26th Sept. 162	do.	26th Sept.
1 Xanth:	=29th Oct. 154	do.	28th Oct.

The only serious discrepancy in Philopator's reign is in the case of Hyperberataeos in his 9th year, but according

to Ginzel the king's name is not clear and might be Euergetes, or Philadelphos. The day is not clear and might be 30 or 1. I have assumed it to be 30 but whichever way it is read it is unsatisfactory.

From the other dates, however, we may assume that Philopator's first year was reckoned from about April 220 to April 219, that is to say overlapping Euergetes' reign. No. 4 dated in the 4th year does not tally and may be hypothetically assigned to the 5th year. Similarly No. 6 dated in the 5th year tallies only for the 6th year. As in some other cases there may have been two methods of reckoning the regnal year, one from adoption as coregent, the other from the death of his predecessor. It will be noted that one scribe dates 28 Gorp. in the first year as equal to 12 Tybi while another dates 30 Gorp. equal to 13 Tybi, the two being inconsistent. They are also inconsistent with Euergetes' date of 1 Lōos = 18 Athyr which even on a month of only 29 days would give 1 Gorp. = 17 Choiak and 28 Gorp. = 14 Tybi. A similar inconsistency occurs in 216 B.C., 1 Artem. = 20 November but 1 Daisios = 22 December.

The date of the 9th year of Epiphanes is from the Rosetta Stone. It is probable that Euergetes' reform ceased to be effective not long after his death as is shown from the position of the Alexandrian calendar at the date of introduction.[67] I have assumed here that a leap year day had been inserted 7 times before the calendar was again allowed to wander. (In South Egypt the Reform may not have been effective at all.) The New Moon dates, however, do not yield sufficiently exact data to say the precise number of days inserted. It might have been as few as 5 or as many as 9 so far as this evidence goes. The Macedonian date on the Rosetta Stone is not in terms of the Macedonian calendar in common use in Egypt (for in

it Xanthikos did not then correspond to April) but in terms of the Seleucid Calendar.

From the 23rd year of Epiphanes onwards to the 16th year of Philometor, the New Moons do not agree well and the calendar has apparently become temporarily stabilized in regard to the seasons. It will be noticed also that from 18th Epiphanes onwards there is a frequent coincidence in the number of the day of the Macedonian month with that of the Egyptian month, so that the lunar calendar may have been abandoned and months of 30 days each used instead commencing the year with 1 Dystros =1 Thoth. The probability of a reform of this nature being made in the 24th year of Epiphanes is increased owing to the impossibility of Dystros being equated with Thoth in his 24th year while Gorpiaios equated with Pharmuthi in his 23rd without missing out a month (Smyly, however, reads Phamenoth in the 23rd year which would render the missing out of a month unnecessary).

In Philometor's 18th and 26th years a reversion is made to the lunar calendar for 4 Peritios is not equated with 4 Mesore but 25 Mesore. The New Moons tally closely if September 162 and November 154 were in his 18th and 26th years respectively, from which we may infer that Philometor began to reign between November 180 and September 179.

Beloch's equations for Philopator's reign are quite out of harmony with the New Moons as follows:

1 Gorp:	=29th Jan.	220	Astr. New Moon	13th Feb.
1 Dais:	=18th Dec.	218	do.	14th Dec.
1 Dios	= 5th May	217	do.	9th May
1 Artem:	=15th Nov.	217	do.	3rd Nov.
1 Apell:	= 7th June	216	do.	28th May
1 Dios	=20th May	212	do.	15th May

This concludes the evidence from the Macedonian-Egyptian equivalents, but it may be convenient to tabulate for reference the position of 1st Dystros of the Macedonian

calendar each year giving its possible Julian equivalent and its Egyptian, Seleucid, and Babylonian equivalents over a considerable period, inserting also any other Macedonian months which are attested. The day of the astronomical New Moon is inserted in all unattested cases though it is probable that the 1st of the lunar months usually fell one or two days later about the date of appearance of the crescent.

B.C.	*Macedonian*	*Julian*	*Egyptian*	*Seleucid*	*Babylonian*
356	1 Dystros	17th Feb.	—	—	—
356	1 Lōos	14th July	—	—	—
348	1 Dystros	20th Mar.	—	—	—
340	1 Dystros	19th April	—	—	—
339	1 Dystros	9th April	—	—	—
339	1 Lōos	3rd Sept.	—	—	—
332	1 Dystros	20th May	—	—	—
331	1 Dystros	10th May	—	—	—
324	1 Dystros	21st June	—	—	—
323	1 Dystros	15th May	5 Phamenoth	—	—
315	1 Dystros	11th July	4 Pakhon	—	—
312	1 Dystros	6th Aug.	1 Payni	—	—
311	1 Dios	31st Mar.	23 Tybi	1 Dios	1 Nisan
304	1 Dystros	6th Sept.	4 Epiphi	1 Dystros	1 Elul
296	1 Dystros	8th Oct.	8 Mesore	1 Dystros	1 Tisri
288	1 Dystros	8th Nov.	6 Thoth	1 Dystros	1 Arahsamna
280	1 Dystros	9th Dec.	9 Phaophi	1 Dystros	1 Kislev
271	1 Dystros	9th Jan.	12 Athyr	1 Dystros	1 Tebitu
264	1 Dystros	21st Mar.	25 Tybi	1 Dystros	1 Adar.b.
264	1 Lōos	17th Aug.	24 Payni	1 Lōos	1 Abu
263	1 Dystros	10th Mar.	14 Tybi	1 Dystros	1 Adar
257	1 Dystros	3rd April	10 Mekhir	1 Xanthikos	1 Nisan
257	1 Artemisios	31st May	8 Pharmuthi	1 Daisios	1 Sivan
256	1 Dystros	24th April	1 Phamenoth	1 Artemisios	1 Airu
255	1 Dystros	11th April	18 Mekhir	1 Xanthikos	1 Nisan
255	1 Daisios	9th July	17 Pachon	1 Panemos	1 Duzu
254	1 Dystros	1st May	8 Phamenoth	1 Artemisios	1 Airu
253	1 Dystros	19th April	27 Mekhir	1 Xanthikos	1 Nisan
252	1 Dystros	6th May	14 Phamenoth	1 Artemisios	1 Airu
252	1 Dios	31st Dec.	8 Athyr	1 Audynaios	1 Tebitu
251	1 Dystros	26th April	4 Phamenoth	1 Artemisios	1 Airu
251	1 Hyperb:	24th Nov.	1 Phaophi	1 Apellaios	1 Kislev
250	1 Dystros	15th April	23 Mekhir	1 Xanthikos	1 Nisan
249	1 Dystros	3rd May	12 Phamenoth	1 Artemisios	1 Airu
249	1 Hyperb:	30th Nov.	8 Phaophi	1 Apellaios	1 Kislev
242	1 Dystros	16th May	26 Phamenoth	1 Artemisios	1 Airu
241	1 Dios	9th Jan.	19 Athyr	1 Audynaios	1 Tebitu
238	1 Dystros	1st June	13 Pharmuthi	1 Daisios	1 Sivan
238	1 Gorp:	26th Nov.	6 Phaophi	1 Apellaios	1 Kislev
235	1 Apell:	28th Feb.	11 Tybi	1 Dystros	1 Adar

B.C.	*Macedonian*	*Julian*	*Egyptian*	*Seleucid*	*Babylonian*
230	1 Dystros	31st July	14 Payni (North)	1 Lōos	1 Abu
229	1 Gorp:	25th Jan.	8 Choiak	1 Peritios	1 Sabatu
226	1 Dystros	21st July	4 Payni	1 Panemos	1 Duzu
222	1 Dystros	31st Aug.	15 Epiphi	1 Gorpiaios	1 Elul
221	1 Dystros	20th Aug.	4 Epiphi	1 Gorpiaios	1 Elul
220	1 Apellaios	14th May	27 Phamenoth	1 Artemisios	1 Airu
220	1 Dystros	9th Aug.	23 Payni	1 Lōos	1 Abu
219	1 Lōos	5th Jan.	18 Athyr	1 Audynaios	1 Tebitu
218	1 Dystros	16th Sept.	1 Mesore	1 Hyperberetaios	1 Tisri
217	1 Dios	9th May	22 Phamenoth	1 Artemisios	1 Airu
216	1 Dystros	23rd Sept.	8 Mesore	1 Hyperberetaios	1 Tisri
216	1 Daisios	22nd Dec.	3 Athyr	1 Audynaios	1 Tebitu
213	1 Dystros	19th Sept.	4 Mesore	1 Hyperberetaios	1 Tisri
205	1 Dystros	21st Oct.	2 Thoth	1 Dios	1 Arahsamna
197	1 Dystros	22nd Oct.	5 Thoth	1 Dios	1 Arahsamna
194	1 Lōos	31st Mar.	15 Mechir	1 Xanthikos	1 Nisan
194	1 Dystros	20th Oct.	3 Thoth	1 Dios	1 Arahsamna
189	1 Dystros	24th Oct.	9 Thoth	1 Dios	1 Arahsamna
186	1 Dystros	21st Oct.	6 Thoth	1 Dios	1 Arahsamna
185	1 Audyn:	11th Aug.	1 Epiphi	1 Lōos	1 Abu
180	1 Dystros	14th Nov.	2 Phaophi	1 Apellaios	1 Kislev
179	1 Gorp:	12th May	1 Pharmuthi	1 Artemisios	1 Airu
179	1 Dystros	14th Oct.	1 Thoth	—	—
177	1 Dystros	13th Oct.	1 Thoth	—	—
173	1 Dystros	12th Oct.	1 Thoth	—	—
165	1 Dystros	10th Oct.	1 Thoth	—	—
163	1 Dystros	6th Nov.	28 Thoth	—	—
162	1 Peritios	26th Sept.	22 Mesore	—	—
154	1 Dystros	28th Sept.	26 Mesore	—	—
154	1 Xanth:	29th Oct.	22 Thoth	—	—
146	1 Dystros	30th Oct.	25 Thoth	—	—
138	1 Dystros	30th Nov.	28 Phaophi	—	—
130	1 Dystros	30th Dec.	30 Athyr	—	—
121	1 Dystros	28th Jan.	1 Tybi	—	—
117	1 Dystros	27th Jan.	1 Tybi	—	—

Plutarch records in his life of Alexander that he was born the 6th Hekatombeon " which month the Macedonians call Lōos," and that Philip received the news at the same time that he heard that his racehorse had won at the Olympic games. If this is not merely a picturesque addition the year is fixed as 356 B.C. and the month of Lōos as beginning about 14th July, since the position of the Attic Hekatombeon is fairly certain.

In Demosthenes' *De Corona* occurs a letter of Philip to the magistrates and councillors of the confederate Peloponnesians in which occur the words " in the ensuing

month of Lōos as we style it, Boedromion as the Athenians, Panemos as the Corinthians." The whole passage is generally regarded as spurious, but though the letter is not authentic the writer may have given the correct equivalents. Lōos certainly would tally with Boedromion about 339 B.C., the approximate date of the letter (on the theory that there were usually 4 intercalations in 8 years). In 339 B.C. 1st Boedromion fell about 3rd September.

Plutarch records in his life of Alexander (16) that before the battle of the Granicus (334 B.C.) to avoid marching in Daisios, Alexander ordered a second Artemisios to be inserted. From his *Camillus* (19) it appears that the battle was fought in the month Thargelion but this is perhaps a calculation of Plutarch based on the later fixed positions of the calendar, not a record by him of a contemporary double date, and does not tally. Though Alexander inserted a second Peritios there may have been the usual 4 intercalations in the octaeteris from 340 to 332, no other intercalary month being inserted in 334. That the Macedonian calendar in its original home was not fixed relatively to the seasons is shown by the double date given by Plutarch in his *Aratus* (53) where Daisios was equivalent to Anthesterion (February), whereas in the year of Alexander's birth it was equivalent to May-June.

Plutarch (*Alex.* 76) narrates that Alexander died on the evening of 28 (or 30) Daisios while the Pseudo-Kallisthenes gives the date as 4 Pharmuthi of the Egyptian calendar. Arrian, however, gave the length of life as 32 years 8 months (GH. iii. 6), which would yield March 323 B.C. as the approximate date if reckoned by the Julian or Attic calendar. Codices B. & C. of the Pseudo-Kallisthenes curiously give μηνὶ Ἀπριλλίῳ νεομηνίᾳ δύσεως δύσης ἡλίου. But the Macedonian calendar of the period yields Daisios equal to August-September and the Egyptian

date of Pseudo-Kallisthenes equals 13th June. Now it so happens that if 1 Dystros was on 15th May 323, as it possibly might be, the astronomical New Moon being on the 12th and visible a few days later, that 30th Dystros would be equivalent to 13th June and it may be that Plutarch has confused Dystros with Daisios especially as in the late period Daisios was equivalent to June (in the Seleucid calendar). Arrian may have got his 32 years 8 months from an original source reckoning by the Macedonian calendar, according to which it is exactly 32 years 8 months from Lōos 356 B.C. to the end of Dystros 323 B.C.

The next date of significance is the commencement of the Seleucid Era, 1 Dios equivalent to 1 Nisan 311. It is usually supposed that Dios fell at a different period of the year from Nisan and that when the Macedonians reckoned from Dios they reckoned from the Autumn. It is difficult to suppose that an Era of this kind was thus doubled, especially as the analysis of the calendar shows Dios coincident with Nisan in that year when following the usual intercalations. It was not till later that the Seleucid calendar became fixed relatively to the Babylonian calendar (at a time when Dios fell in autumn).

From the date in 264 it is evident that in one octaeteris between 312 and 263 there were 5 instead of 4 intercalations. I have assumed that it was between 271 and 263 but it may, of course, have been earlier. There is an attested date in almost every year in the octaeteris from 257 to 249 so that the probable equivalent of 1 Dystros in each year may be filled in and the octaeteris taken as a starting point forward or backward in multiples of 8 years. In the octaeteris from 238 to 230 there were 5 intercalations instead of 4 as Dystros has jumped 2 months. On the other hand from 254 to 238 there have

only been 7 intercalations instead of 8 so that the two variations balance each other and it may be that the cycle used was really a 16 year cycle.

From 179 to 165 B.C. as we have seen the lunar calendar was temporarily abandoned, and then again revived in 164 or 163, Dystros in the revived calendar being the lunar month most nearly coincident with Thoth. But as the calendar was once more stabilised by about 117 B.C. with Dystros equivalent to Tybi, from 154 the old 8 year cycle with 4 intercalations must have been in use with the result that Dystros fell one month later in each cycle till about 121 when the astronomical New Moon coincided with 1 Tybi. From that point on the Egypto-Macedonian months were of 30 days each.

NOTE 66. THE CALENDAR OF ESNEH.

Ptolemy Euergetes II. began to reign in 144 B.C. and died in 115. He "repaired some temples and built small additions to others at Karnak and Madinat Habu, and he finished the building of the temple of Edfu." (BS. 156.) "At Kom-Ombo, at Medinet Habu, at Der-el-Medineh, at El Kab, the existing remains bear witness to Euergetes II. as a builder or restorer of temples in honour of Egyptian gods" (BE. 321). The sanctuary at Esneh had been built in the reign of Ptolemy Euergetes I.

The calendar of Esneh shows that in the year to which it referred the beginning of the "year of the ancients" fell on 9th Thoth and another New Year's Day on the 26th Payni (BM. 19-22). The "year of the ancients" commenced with the heliacal Rising of Spica and the other New Year's Day is clearly the only other which does not necessarily fall on the 1st of a month of the calendar, namely that coinciding with the heliacal Rising of Sirius. If the Reform of Ptolemy Euergetes I. was not effective in South Egypt and the Wandering Calendar continued as before, the Epagomenae being before Thoth, 9th Thoth would correspond with the Rising of Spica (30th September) in 118 B.C. and 26th Payni with the Rising of Sirius (13th July) in 117 B.C. The Feast* of the Appearance of Amon commenced according to the calendar on 19th Phaophi (BM. 96). In 118 B.C. 19th Phaophi was equivalent to 9th November. Jupiter (Amon) rose on 16th November in that year. It seems probable, therefore, that the calendar belongs to the reign of Ptolemy Euergetes II.

* This particular Feast may be merely commemorative for it is recorded on several old calendars as occurring on the 19th of the second month.

The idea that the dates are Alexandrian and that the New Year of the Ancients on 9th Thoth was the 1st of the Wandering Calendar κατὰ τοὺς ἀρχαίους is quite untenable. If at the introduction of the Alexandrian Calendar 1st Thoth of the Wandering Calendar corresponded with 1st Thoth Alexandrian, 1st Thoth of the Wandering Calendar would not correspond with 9th Thoth Alexandrian till 1,428 years later! There is in reality no reference to the Alexandrian Calendar.

According to Lepsius the inscription belonged to the reign of the Emperor Claudius, but Brugsch is emphatic (BM. 22) that he can discover no trace of the royal name either in the calendar itself or in the inscriptions near it.

Though the calendar is the Wandering Calendar of 118 B.C. the scribe has also inserted in it the Festivals of the Sacred Calendar[60] in which the first month was Re Hor Khouti (not Thoth). Thus while the Feast of Isis[61] was on 6th Phaophi, 27 days after the New Year of the Ancients and therefore on 28th fixed Hathor (the 4th month of the Sacred Calendar), there is also recorded on 26th Choiak "Sokar Festival," Choiak being the 4th month of the then Wandering Calendar and the "Sokar Festival" being simply the ancient Feast of Isis as formerly held about the 26th of the 4th month of the Sacred Calendar.

Also the Feast of Sechmet is recorded on the 1st of the 3rd month Athyr, though it really belongs to the 1st of the 3rd month of the Sacred Calendar namely Menkhet, Sechmet being another name for Ptah the lord of Menkhet.

Under the date 2nd of the 8th month, Pharmuthi, there is the record "Birth of the Sun." If correctly translated this can only mean the Winter Solstice. The 2nd of Pharmuthi of the Wandering Calendar was not at that time near the Winter Solstice, so the record is evidently copied from an old calendar. In the Sacred Calendar the

2nd of the 8th month (which was Phamenoth) was 121 days after the Rising of Spica. Now the only period when the Winter Solstice was 121 days after the Rising of Spica was about 2700 B.C. when Spica rose about 12th September and the Solstice was about 11th January, but as at that early period the day of the Solstice may not have been correctly calculated, the epoch may be between 3100 and 2300 B.C. As we have seen about 2400 B.C. was a time of astronomical activity at Denderah and some of the dates of Festivals may have been copied in the Ptolemaic Calendars from an old Denderah Calendar. At the period of the oblong Denderah zodiac,[29] the first month of the Wandering Calendar (then Hathor) coincided with the first month of the fixed Sacred Calendar (Re Hor Khouti).

Reverting to the Festivals which properly belong to the year to which the Esneh Calendar itself refers, namely 22nd September (1st Thoth) 118 B.C. to 20th September 117 B.C., we find that the Bubastia were held on 16th Payni, namely 3rd July 117 B.C. Mars (Bast) rose heliacally on or about that date.

Mercury was in conjunction with the Sun on 15th January 117 B.C., 26th Choiak, the day of the Sokar Festival, being invisible from about 1st to 23rd January.

One of the days of the calendar, the 4th of the 2nd month (Phaophi) has a special name Kambaus (BM. 86). The only other place where this name has been found is in a temple erected in the reign of Ptolemy Euergetes II. This increases the probability that the Esneh Calendar belongs to his reign.

NOTE 67. THE ALEXANDRIAN CALENDAR.

The Alexandrian Calendar consists of 12 months to which the names of the 12 months of the ancient Egyptian Calendar were given, of 30 days each, with 5 epagomenal days, and a leap year day* in every year in which the Julian Calendar had a leap year day. It thus maintained always the same position relative to the Julian Calendar (save for 1 day difference during a portion of the leap year).

In A.D. 81 1st April of the Julian Calendar was equivalent[70] to 6th Pharmuthi of the Alexandrian, and we thus have the following equivalences at that date :

Julian	*Alexandrian*
1st January	6th Tybi
26th January	1st Mekhir
1st February	7th Mekhir
25th February	1st Phamenoth
1st March	5th Phamenoth
27th March	1st Pharmuthi
1st April	6th Pharmuthi
26th April	1st Pakhon
1st May	6th Pakhon
26th May	1st Payni
1st June	7th Payni
25th June	1st Epiphi
1st July	7th Epiphi
19th July	25th Epiphi
25th July	1st Mesore
1st August	8th Mesore
24th August	1st Epagomenal Day
29th August	1st Thoth
1st September	4th Thoth
28th September	1st Paophi
1st October	4th Paophi
28th October	1st Athyr
1st November	5th Athyr
27th November	1st Khoiak
1st December	5th Khoiak
27th December	1st Tybi

* It is not certain whether this was inserted before the 1st Thoth preceding the Julian leap year or before the 1st Thoth in the Julian leap year.

As regards the ascertainment of the date when the calendar was introduced there are two methods of approach, the historical and the mathematical. On historical grounds Lepsius came to the conclusion that it must have been introduced between 8 B.C. and 5 A.D. On mathematical grounds the date has been variously stated, the most commonly quoted date being 26 B.C.

The mathematical argument is based on the number of days difference between the ancient Wandering Egyptian Calendar and the Alexandrian calendar and the assumption that the Alexandrian calendar was introduced when 1st Thoth of the Wandering Calendar coincided with 29th August Julian, the date with which 1st Thoth of the Alexandrian calendar was equated. It is to be noted, however, that Lepsius was so strongly of opinion that the date of introduction was much later than 26 B.C. that he postulated that when introduced the Alexandrian calendar was made to conform with the position of the Wandering Calendar at an earlier date than the date of introduction. This seems improbable.

In order to arrive at a correct understanding of the matter it is necessary to examine the state of the Roman calendar itself in the time of Augustus. When Julius Cæsar reformed the calendar in 46 B.C., he provided a year of 365 days with an extra day every fourth year, but the pontiffs misunderstood the intercalation and added a day every third year. The consequence was that after 36 years there would have been 12 intercalations instead of 9. Augustus to remedy this directed that there should be no intercalation in the 37th year, 41st year, or 45th year, so that the calendar would be brought back to its original position. The 37th to 48th years were thus all common years, and the 49th of the Julian Era the first leap year of the series which continued uninterrupted till the introduction

of the Gregorian calendar. While this change is well known to Roman chronologists, it has been usually completely overlooked by authors dealing with the date of introduction of the Alexandrian calendar. It is also to be borne in mind that Augustus altered the lengths of the months of the Roman calendar. Both these facts have an important bearing on the question before us, for it is clear that when the Alexandrian calendar was introduced 1st Thoth must according to the theory have corresponded with 29th August of the Roman calendar actually in use at the time and would have intercalations in the same years as the Roman calendar and would not necessarily correspond with 29th August of the astronomical Julian calendar.

Now it is clear that if the 49th year of the Julian Era was a leap year, the first year must have been 45 B.C. not 46 B.C. since a given date in 4 A.D. (which was, of course, a leap year) would be 48 years from 45 B.C. and 48 years were thus completed at the beginning of 1st January 4 A.D. when the 49th year commenced.

We may therefore tabulate the astronomical Julian dates equivalent to 29th August of the Roman calendar from the 37th to 49th years of the Julian Era.

Year of Julian Era	*Year of Christian Era*	*Astronomical Julian Equivalent*
37th	9 B.C.	31st August
38th	8	31st
39th	7	31st
40th	6	31st
41st	5	30th August
42nd	4	30th
43rd	3	30th
44th	2	30th
45th	1 B.C	29th August
46th	1 A.D.	29th
47th	2	29th
48th	3	29th
49th	4	29th August

It may be presumed that it was about the same period that Augustus took a day from February and added it to

August, and that prior to 9 B.C. February contained 29 days (30 in leap years) so that the Roman 29th August in 10 B.C. corresponded to 2nd September (astronomical) and consequently corresponded* to 30th August (astronomical) in the first year of the Era, the correspondence from the 1st to 36th years of the Era being as follows:

Year of Julian Era	*Year of Christian Era*	*Astronomical Julian Equivalent*
1st	45 B.C.	30th August
2nd	44	30th August
3rd	43	30th August
4th	42 r.†	31st August
5th	41 a.‡	30th August
6th	40	30th August
7th	39 r.	31st August
8th	38	31st August
9th	37 a.	30th August
10th	36 r.	31st August
11th	35	31st August
12th	34	31st August
13th	33 r. a.	31st August
14th	32	31st August
15th	31	31st August
16th	30 r.	1st September
17th	29 a.	31st August
18th	28	31st August
19th	27 r.	1st September
20th	26	1st September
21st	25 a.	31st August
22nd	24 r.	1st September
23rd	23	1st September
24th	22	1st September
25th	21 r. a.	1st September
26th	20	1st September
27th	19	1st September
28th	18 r.	2nd September
29th	17 a.	1st September
30th	16	1st September
31st	15 r.	2nd September
32nd	14	2nd September
33rd	13 a.	3rd September
34th	12 r.	2nd September
35th	11	2nd September
36th	10	2nd September

* Though the Roman 29th August corresponded to 30th August astronomical in 45 B.C. the Roman 1st January corresponded with 1st January astronomical in that year, months from March to August inclusive being displaced one day.

† r. = Roman leap year.

‡ a. = Astronomical leap year.

It will be observed that in 26 B.C. the Roman 29th August corresponded with 1st September astronomical, but 1st Thoth of the Wandering Calendar corresponded with 1st September (astronomical Julian) from 37 to 34 B.C. and the only dates when 1st Thoth corresponded with the Roman 29th August would be 33, 32, and 31 B.C. when it was equivalent to 31st August astronomical, then equivalent to 29th August Roman. As Antonius only died in 31 B.C. it can hardly be regarded as probable that Augustus reformed the Egyptian calendar then or earlier. Nor can we get out of the difficulty by supposing that the Alexandrian calendar from 26 B.C. had a leap year once in 4 years, for it is extremely improbable that Augustus would introduce such a calendar in Egypt and yet leave the Roman calendar at that period with the triennial intercalation.

It therefore seems better to reject the current mathematical theory, accept the historical theory of Lepsius, and seek for another explanation why the Alexandrian calendar has 1st Thoth equivalent to 29th August. One explanation is that on some date between 8 B.C. and 5 A.D. 1st Thoth of the Wandering Calendar did in fact correspond with the Roman 29th August, in other words that we are not justified in assuming from the evidence of 81 to 139 A.D. that the movement of the Wandering Calendar was uniform from 8 B.C. to that date or that no change was made in it. It seems probable to me now, however, that in South Egypt the Wandering Calendar progressed uniformly from 721 B.C. to 139 A.D. and that if a Wandering Calendar corresponded with the Alexandrian calendar between 8 B.C. and 5 A.D. that Wandering Calendar was confined to North Egypt only and became extinct when the Alexandrian calendar was introduced.

This North Egypt calendar would be the Ancient

Calendar delayed in its movement by the reform[61] of Ptolemy III. Euergetes. It has been supposed that this reform took no effect but the evidence from Macedonian dates[62] seems to indicate that it is probable that it did and we may postulate that for a number of years a leap year day was inserted every fourth year in North Egypt, though the reform was ineffective in the South.

There is, however, another possible explanation of the position of the Alexandrian calendar. From about 117 B.C. onwards the old Macedonian lunar calendar had been abandoned in Egypt and the Macedonian month names used as equivalent to the Egyptian 30 day months. Now the intercalary month in the Macedonian calendar had been inserted before Dystros, and Dystros was really originally the first month of the year. It is possible therefore that the 5 epagomenae in the Macedonian 365 day calendar were at first inserted before Dystros, not before Dios the equivalent of Thoth, and Augustus when he introduced the Alexandrian calendar may have regarded Dystros (Tybi) as the first month and might decree that 1st Dystros was to be equivalent to 1st January with the following result:

Augustan		*Egyptian Macedonian*		*Alexandrian*
January 1st	=	Dystros 1	=	Tybi 1
January 31st	=	Xanthikos 1	=	Mechir 1
March 2nd	=	Artemisios 1	=	Phamenoth 1
April 1st	=	Desius 1	=	Pharmuthi 1
May 1st	=	Panemos 1	=	Pachons 1
May 31st	=	Lôos 1	=	Payni 1
June 30th	=	Gorpiaeus 1	=	Epiphi 1
July 30th	=	Hyperberetaeus 1	=	Mesore 1
August 29th	=	Dios 1	=	Thoth 1
September 28th	=	Apellaeus 1	=	Phaophi 1
October 28th	=	Andynaeus 1	=	Athyr 1
November 27th	=	Peritius 1	=	Choiak 1
December 27th	=	1st Epagomenal Day	=	1st Epagomenal Day

The native Egyptians might object to the epagomenae being placed after Choiak and shortly after they might be transferred to their old place before Thoth, leaving

Thoth 1 equivalent to August 29th but making Tybi 1 no longer equivalent to January 1st.

It seems better, however, to suppose that the Northern Egyptian calendar actually was at the date of introduction of the Alexandrian calendar in the position relatively to the Roman calendar in which it became finally fixed. I formerly assumed that Euergetes I. placed the epagomenae before Payni but the evidence from lunar months seems against this and I now assume that though an extra day was inserted every fourth year before 1st Payni the epagomenae were not transferred. If during 28 years 7 leap year days were inserted and thereafter the calendar "wandered" again, 1st Thoth would correspond with 29th August of the Roman calendar from 4 to 7 A.D. If 6 leap year days only were inserted it would correspond from 9 B.C. to 3 A.D., that is, throughout the whole period of readjustment of the Roman calendar by Augustus, when it temporarily consisted of 365 days with no leap year like the Egyptian Wandering Calendar.

We may, therefore, agree with Lepsius that it is possible that the reform took place between 8 or 9 B.C. and 4 or 5 A.D. After the reform there would be no Græco-Egyptian Wandering Calendar but only the old Egyptian Wandering Calendar which had persisted in the South.

NOTE 68. THE STATEMENT OF CENSORINUS.

Censorinus gives us the following information in regard to the Wandering Calendar and the Rising of Sirius (C. XXI.) : " Sed horum initium semper a primo die mensis eius sumuntur, cui apud Aegyptios nomen est Thoth : quique hoc anno fuit ante diem VII. Kal. Jul. cum abhinc annos centum, Imperatore Antonino Pio II. et Bruttio praesente cons. iidem dies fuerint ante diem XII. Kal. August. quo tempore solet canicula in Aegypto facere exortium. Quare scire . . . . licet anni illius magni nunc agi vertentem annum centesimum."

As the text stands he thus explains that in the year in which he writes 1st Thoth was equivalent to 25th June and that 100 years before it was equivalent to 21st July. This implies a change in the calendar of 26 days, but in 100 years the change would be 25 days, and Scaliger proposed to emend "XII. Kal. August." to "XIII. Kal. August." yielding the date 20th July.

Censorinus tells us the date at which he writes (C. 113). It is:

1040	years	from	the	Olympiad Era
896	"	"	"	Founding of Rome
283	"	"	"	Parilibus
986	"	"	"	Nabonassar's Era
562	"	"	"	Philippi

Apart from the date of the Founding of Rome, which is not in accord with the usually accepted date (753 B.C., from which the interval would be 992 years), all these dates yield the same year—namely A.D. 239-240—as the year in which he was writing.

Censorinus also calls it 265 years from Augustus, but

he is careful to add that the Egyptians reckoned it the 267th year "because they came under the Roman power two years previously."

Now from horoscopes on Greek papyri[79] we know that in 139 A.D. 1st Thoth must have corresponded to 20th July so that we have here an expression of opinion by Censorinus that Sirius rising was not visible till 20th July in that year. Calculation would suggest, however, that sharp sighted priests ought to have been able to see it on the 19th though in Censorinus' time 100 years later it would not be visible till the 20th in the last year of the Julian tetraeteris. However we cannot always be certain of the exact day of visibility owing to differences of atmospheric conditions and of observation on the part of the priests. It is not necessary, however, to exaggerate the margin of error by proposing as Nicklin did the use of "a small lens," meaning presumably two small lenses to form a telescope of which there is no record in Egyptian literature. Petrie also supposes that the distance of Sirius from the Sun on the day of heliacal rising would vary so much at different epochs as to cause great differences in the visibility: but the difference of visibility from this cause is minute. It might conceivably turn the scale between 1 day and the next at certain epochs but that is all. We may agree that about 139-143 A.D. Sirius rose on 1st Thoth.

Censorinus' statement does not of course imply that Sirius was always the chief measuring star or that Thoth was always the first month of the Egyptian calendar.

PLATE XV. ATHRIBIS: ZODIAC TOMB: ZODIAC A.

Reproduced by the kind permission of Professor Sir Flinders Petrie from his "Athribis."

See Note 69.

(*facing page* 325)

NOTE 69. THE ZODIAC TOMB AT ATHRIBIS.

According to Petrie, "For many years a tomb has stood open, roughly painted with funereal subjects on the sides, and two zodiacs on the ceiling, containing the horoscopes of the deceased. . . . The position is in the lowest of the line of tombs cut in the cliff face; but it is curiously invisible from below, as the entrance is blocked up with rubbish in front. The name of the owner seems to have been Mery-Hor. He was son of Ab-pe-many, who was son of Mehyt. The Egyptian's first sketch was drawn on the walls of the tomb in yellow, and the black outlines and colours were added to that. The present outline copy was made by Herr Schuler, helped by Mr. Wyatt; this was checked and coloured by myself.

"The two zodiacs painted on the ceiling are the main interest of this tomb. . . . It should be noticed that the two zodiacs differ, both in detail and in the starting-point. That here marked A,* is divided at Aries-Taurus, and at Libra-Scorpio, or about the end of April and of October in Roman times. The zodiac B† has fewer constellations, and is divided at Gemini-Cancer, and at Sagittarius-Capricornus, or the end of June and of December. These divisions may refer to the May year and the solstitial year, or perhaps to the signs that were above and below the horizon at the hours of the horoscopes." (PA. 12.) "These two horoscopes are probably those of the two *ba*-birds named in the sky—the owner

* See Plate XV.

† See Plate XVI.

Mery-Hor and his father. The signs around both the zodiacs are probably the decans or mansions of the Moon. This ceiling is apparently the only coloured zodiac that is preserved.

. . . . .

"It may be added here that the tombs of Athribis seem all to belong to a late age; none could be dated earlier than the Ptolemaic period. They lie in several strata, and were largely cut as quarries adapted for tombs. Probably the quarrymen made a business of providing tombs. Some are shallow pits with chambers below; but the majority are merely rooms cut in the rock. They extend from that marked 'North Tomb' on the plan to a little beyond the tomb with a Greek inscription at the South. Only one other tomb has a hieroglyphic text."

Lepsius suggested that the Egyptian Set, Horus, and Isis, represented Mercury, Mars, and Venus respectively and Mahler adopted this identification in his examination of the zodiacs in the Ramesseum, which however did not yield quite satisfactory results, there not being at any period a complete correspondence between the calculated positions of the planets and the positions shown. Using the same identifications E. B. Knobel examined the horoscopes at present under consideration but was unable to find any date when the calculated positions tallied completely with the horoscope figures. (PA. 23.)

For Zodiac A he postulated a date in the last quarter of January, A.D. 59, as being most nearly in accord, being the only year that suited for Mars, Jupiter, Saturn, though Venus and Mercury were quite out of position: and suggested May 20, A.D. 52, for Zodiac B, though Mercury is discordant. The placing of the two dates so close together is also in contradiction of Sir Flinders Petrie's opinion that the horoscopes are those of father and son.

PLATE XVI. ATHRIBIS: ZODIAC TOMB: ZODIAC B.

Reproduced by the kind permission of Professor Sir Flinders Petrie from his "Athribis."

See Note 69.

(*facing page* 327)

I have elsewhere (MB. 139 and 178) given reasons for my belief that the correct identifications of Set, Horus, and Isis, are Mars, Venus, and Mercury respectively, and if these identifications are adopted here these two horoscopes admit of solutions giving planetary positions closely in accord with those indicated in the figures.

Thus Zodiac A indicates a date when Mars (Set) was in Capricorn, the Sun and Venus (Horus) in Aquarius, Mercury (Isis) in Pisces, Saturn (the bull-headed bird facing left) in Gemini, Jupiter (the bird facing right) in Leo, and the Moon in Sagittarius.

On 10th February, 177 A.D., Mars was in Capricorn, the Sun and Venus (Horus) were in conjunction in Aquarius (perhaps thus giving rise to the Native's name Mery-Hor), Mercury was in Pisces, Saturn in Gemini, Jupiter in Leo and the Moon in Sagittarius, tallying completely with the requirements of the figure.

Comparison of the planetary symbols in the second horoscope Zodiac B shows some differences from the symbols in Zodiac A, but Set (Mars) is again in Capricorn. (Sir Flinders Petrie, as the terms of his description show,* would have read this symbol as Set, had it not been for Lepsius' identification of Set with Mercury, a position for Mercury in Capricorn when the Sun was in Taurus being astronomically impossible.) We may also identify with certainty the Saturn bird in Pisces, and the Sun and Isis (Mercury) in Taurus. Also in Taurus is a bird facing left, partly erased. This must be Venus. The Moon is in Gemini, and we are left with a bird facing right to represent Jupiter as in Zodiac A. It is in Cancer. Examination of planetary positions yields as the only possible date, about

* He wrote " In Zodiac B Jupiter must apparently be identified with the long headed hawk in Capricornus, as that is too far from the Sun to be Mercury."

26th April, 141 A.D., when Sun, Mercury, Venus were all in Taurus, the Moon in Gemini, Jupiter in Cancer, Mars in Capricorn, and Saturn in Pisces, thus having no planet out of harmony with the figure.

At the date in question the equinoctial zodiac and zodiac of the constellations were almost coincident so that the above remarks apply to both zodiacs.

As the chance of seven different heavenly bodies each being in a given sign of 12 on any day is $(\frac{1}{12})^7$ and therefore the combination shown in Zodiac A occurs on an average on only 1 day in 35,831,808 days and that in Zodiac B is equally rare, my identifications may be considered as probably correct, as the dates obtained not only fall in the period to which they are supposed to belong but also show an interval of slightly less than 36 years, a reasonable interval between the birth of father and son. As I had not examined these zodiacs when I first proposed my planetary identifications the coincidence is the more striking.

There is, however, another way of approaching the problem. In Zodiac A the Sun was in Aquarius (or conceivably the end of Capricorn). As Mercury and Venus cannot be far from the Sun they cannot be equated either with the bird in Leo or the bird in Gemini. But neither of them can be equated with the Set bird in Capricorn because in Zodiac B it is in Capricorn when the Sun is in Taurus. It therefore follows that of the two symbols Horus in Aquarius and Isis in Pisces one must represent Venus and the other Mercury. It is clear that of the three remaining symbols one must be Saturn. Now in the period under consideration (*i.e.*, Roman times in Egypt) a date might be found when Saturn was in Leo and Jupiter in Capricorn, but we cannot identify Set as Jupiter because in Zodiac B it is again in Capricorn, while no planetary

configuration can be found with Jupiter in Capricorn which also satisfies the other requirements of the horoscope. Nor at that epoch could Jupiter be in Gemini when Saturn was in Leo. Similarly it is possible to examine all possible planetary identities, and show that no possible identifications could be framed which would satisfy the requirements of both figures and yield dates within the period, except the identifications I have given.

As the date of Zodiac A falls in 177 A.D. a new piece of evidence of value emerges. It will be noticed that the Hathor cow is below the scales and has the Sothic symbol in its horns. Previous writers on Egyptian astronomy have insisted that this Sothic symbol denoted Sirius, or if not Sirius then the New Year's Day of the Wandering Calendar. In this figure it obviously cannot denote Sirius which rises at the same time as the beginning of Leo (or end of Cancer), for the symbol would have been placed under the beginning of Leo. Nor can it denote 1st Thoth of the Wandering Calendar, for in 177 A.D. 1st Thoth was equivalent to 10th July (Julian) when Cancer was rising.

It is instead opposite the beginning of Libra (or possibly Virgo as the two signs are close together). The Rising of Spica at the beginning of Libra was—as I pointed out before seeing this zodiac (MB.)—the beginning of the Year of the Ancients and of fixed Hathor, so that the Sothic symbol here most probably refers to the Rising of Spica or it might conceivably denote 1st Hathor of the Wandering Calendar, equivalent in 177 A.D. to 8th September when Virgo was rising.

NOTE 70. EVIDENCE FROM GREEK PAPYRI AND ALEXANDRIAN DATES.

There is some evidence from Greek papyri which is valuable for ascertaining the position of the Wandering Calendar and checking the position of the Alexandrian calendar[67] in the period from A.D. 16 to A.D. 316. Some papyri contain double dates, an Alexandrian date and a Wandering Calendar date, and if the position of the Alexandrian calendar is definitely established the position of the Wandering Calendar can be deduced. Occasionally a third date is given, that of the Julian calendar, which affords a further check. Finally some of the examples are dates of horoscopes and the dates can be checked by calculation of the planetary positions. The validity of this last check depends on the accuracy of the ancient scribes who drew up the horoscopes, and we are not entitled to assume that they were accurate to a degree. It is therefore only in cases where the position of the Moon is given that the exact day can be determined astronomically. One of the earliest pieces of evidence of this type is the horoscope of Tryphon (OP. ii. No. 235). The style is not later than 50 A.D. It is dated in the reign of Tiberius but the year is missing. The date is given as Phaophi 1 (of Alexandrian calendar) Phaophi 11 to (12) κατὰ τοὺς ἀρχαίους χρόνους "4th hour of night." The mode of expression shows that the days of the Wandering Calendar terminated at midnight while those of the Alexandrian calendar were reckoned from sunset to sunset. The planetary positions given are: Moon in Taurus, Sun and Mars in Libra, Mercury and Venus in Scorpio, Saturn and Jupiter in Sagittarius.

Phaophi 1 of the Alexandrian calendar is September 28th. As Dr. A. A. Rambaut pointed out, the planets were never all in the positions stated on any September 28th during the reign of Tiberius. I have examined possible correspondences and find that the planets more closely tallied with the positions given on the night of October 7th/8th 16 A.D., than on any other date. Their sign positions (in the zodiac of Constellations measured from Spica) on that date were as follows: Moon in Taurus, Sun and Mars in Libra, Mercury in Virgo, Venus in Scorpio, Saturn in Sagittarius, Jupiter in Capricorn. The difference in Mercury's position may be due to the difficulty in calculating its position on the part of the scribe, or he may have been copying from an ephemeris in which the symbols of Virgo and Scorpio were as easily confused as they are to-day (♍ and ♏). In the horoscope figure which accompanies the description Jupiter is shown further on in the zodiac than Saturn, but the error here is not easily explained.

Now it so happens that October 8th is Phaophi 11 of the Alexandrian calendar, and what the scribe may have done is to look up the planets' positions in an ephemeris under the date Phaophi 11 thinking that the ephemeris was dated in terms of the Wandering Calendar whereas it was in terms of the Alexandrian calendar.* He thus

* Since the above was written Poul Heegaard has discussed the date of a horoscope of "Philoe" in the Appendix to Papyri Osloenses Fasc. II. This horoscope discloses a similar error. It is dated in the reign of Antoninus "at the fourth hour of the night between the 15th and 16th Phamenoth." The planetary positions given are shown by Heegaard to tally approximately for the night of 12th-13th, or 13th-14th, or 14th-15th March A.D. 150 (in the 13th year of Antoninus). He supposes that the horoscope is intended to be dated in the Alexandrian calendar in which Phamenoth 16 equals 12th March, but the mode of expression by double date shows that it is κατὰ τοὺς ἀρχαίους χρόνους and that the scribe has not realised that the ephemeris he consulted was in terms of the Alexandrian calendar. (In any case the scribe has taken the Alexandrian positions for the night preceding Phamenoth 17 (or 18, or 19). Heegaard unsuccessfully attempts to explain the discrepancy by Manitius' theory of astronomical and civil calendar differences. But on that theory "in the post-meridian and night hours the first of the two dates is to be taken in both cases." The first date named, 15th Phamenoth, was equivalent to 11th March.)

computed the horoscope for Phaophi 11 Alexandrian when he should have computed for Phaophi 1. But not only has he misunderstood the Ephemeris but he has made an error of a day in converting the Alexandrian date into the Egyptian date. If we are to judge by the other horoscopes the night preceding Phaophi 1 should have corresponded to the night of Phaophi 10 to 11 in 16 A.D., not 11 to 12.

The next double date is in a known year A.D. 30 when Tybi 18 corresponded to Mechir 1 of the Wandering Calendar, a difference of 13 days.

The next date is that in the horoscope of Pitenius* (CXXX. in KC. 132). The year is given as the 3rd year of Titus, Kalends of April, 6th Pharmuthi, 1st to 2nd Pachon, 3rd hour of night, and the planetary positions are stated on the papyrus. Compared with the calculated positions for the evening of 31st March 81 A.D. they are as follows :

	Sun	*Moon*	*Mercury*	*Venus*	*Mars*	*Jupiter*	*Saturn*
Papyrus	Aries 14	Taurus 13	Aries	Pisces 16	Aquarius 16	Cancer 6	Pisces 6
Equinoctial Zodiac	Aries 9	Taurus 10½	Aries 11	Pisces 10	Aquarius 13½	Cancer 0½	Pisces 0½
Zodiac measured from Spica	Aries 11½	Taurus 13	Aries 13	Pisces 12	Aquarius 16	Cancer 3	Pisces 3

The scribe is therefore remarkably accurate and we can make fairly reliable deductions from this horoscope. (1) This scribe reckons both 1st April and 6th Pharmuthi (Alexandrian) from the previous sunset, but reckons the date of the Wandering Calendar from midnight. (2) Noon 1st April=Noon 6th Pharmuthi=Noon 2nd Pachon in 81 A.D.

In 132 and 135 A.D. there are double dates from Ptolemy (Canon of Kings iv. 5) both giving 1st Thoth=21st July. Thus in 136-139 1st Thoth would equal 20th July.

* See Plate XVII.

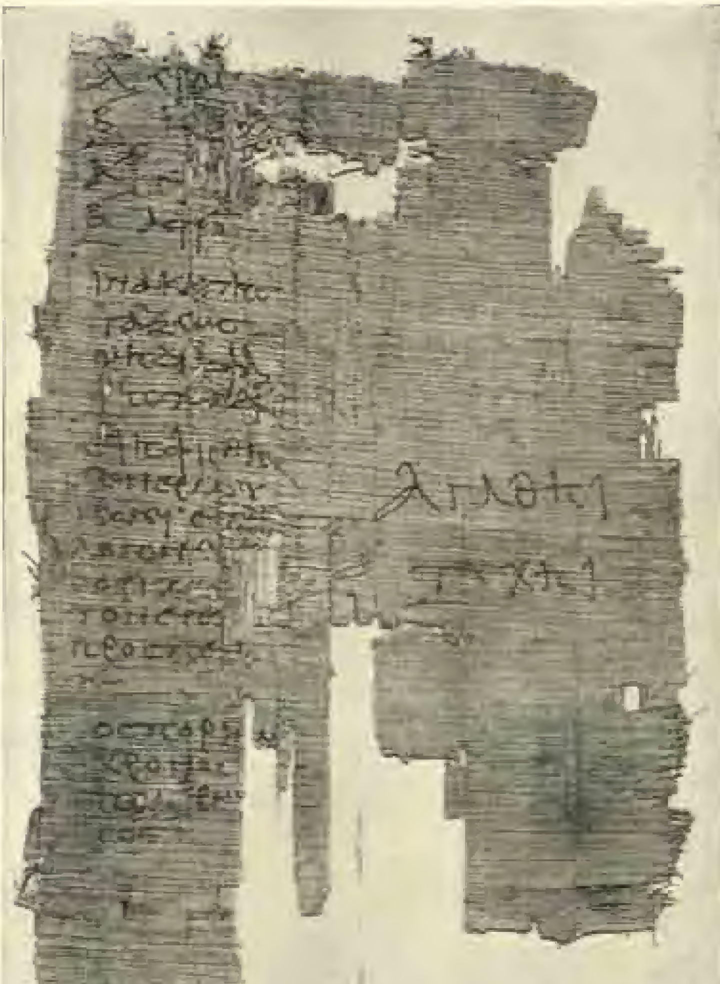

PLATE XVII. FRAGMENT OF THE HOROSCOPE OF PITENIUS.

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See Note 70. (*facing page* 332)

To the same tetraeteris belongs the horoscope of Anubion (CX. in KC.) born in the first year of Antoninus, 8th of the month Adrian, 18th of the month Tybi, at the first hour of the day. The planetary positions are given as follows:

Sun, Sagittarius 13° 23′; Moon, Aquarius 3° 7′; Mercury, Sagittarius 15° 2′; Venus, Sagittarius 9° 4′; Mars, Capricornus 30° 0′; Jupiter, Aries 12° 44′; Saturn, Aquarius 3° 8′. With the exception of Mercury, these positions tally fairly closely with the calculated positions for the morning of 4th December (Julian) 137 A.D. As from other cases we can deduce that 4th December was equivalent to 8th Khoiak (Alexandrian), we may assume that the name Adrian was given to Khoiak at this period. 18th Tybi is therefore the date in the Wandering Calendar and its equivalence with 4th December is completely in accord with the equivalence of 1st Thoth with 20th July in that tetraeteris.

Evidence from the same period might have been obtained from two horoscopes of the 2nd and 13th years of Antoninus but the planetary positions given do not tally with any calculated date (OP. III. 282).

The next date* is on a torn fragment of a horoscope (FT. 294), the first year of Marcus and Verus (A.D. 161) "Mesore 5 according to the Greeks, Thoth 16 ancient style." Mesore 5 of the Alexandrian calendar was equivalent to 29th July. If 1st Thoth of the Wandering Calendar was equivalent to 20th July in 137 A.D., 24 years later in 161 A.D. it would be equivalent to 14th July and 16th Thoth would be equivalent to 29th July, so that this horoscope date is quite in accord with previous dates. The horoscope itself is missing.

* But see footnote on p. 331.

There is an astrological calendar (OP. III. 126) which from its style is attributed to the late 2nd century. Pharmuthi is regarded as the month of Aquarius, presided over by Nebu (perhaps the Babylonian Nebo, Saturn, ruler of Aquarius), and Pachon is presumed to begin with the beginning of Pisces. On this basis Khoiak would correspond with the rising of Libra and the date of the calendar would be when 1st Khoiak was equivalent to the Rising of Spica, about 3rd October. This occurred about 196-199 A.D. if the calendar continued to "wander," thus tallying with the other evidence. Owing to the fact that the date of writing is only approximately known this evidence is not of much weight taken by itself.

The latest known date in terms of *ἀρχαῖοι χρόνοι* is in A.D. 237 (OP. II. 138). There are, however, some other Alexandrian dates which should be mentioned here, as they confirm the position of the Alexandrian calendar relative to the Julian calendar.

There is a horoscope of a person born on Thoth 27 in the 6th year of Valerian, Gallienus, and Saloninus (OP. XII. 277, No. 1563). The planetary positions are given precisely in degrees and minutes and have been examined by Dr. Fotheringham who has shown (*Op. cit.* 231) that they tally closely with the calculated positions for 24th September 258 A.D. The equation 27th Thoth=24th September tallies with the other evidence of the Alexandrian calendar.

Dr. Fotheringham has also examined the horoscope of Sarapammon (*loc. cit.*). It is dated Phaophi 2 of the 1st year of Macrianus and the calculated positions tally closely for 29th September 260 A.D. The horoscope of a person born Phamenoth 27 (March 23rd) of the 1st year of Carinus (No. 1564) and one on the last day of the 9th year of Diocletian (5th Epagomenal Day, August 28th) (No. 1565)

yield equally satisfactory results for 283 and 293 A.D. respectively, though the position of the Moon is not given so precisely as to confirm the exact day.

The latest horoscope dated by the Alexandrian calendar is one of the 33rd year of the Diocletian Era (CR. VIII. 70). It is dated 28th Thoth, the 5th hour of the day, and the planetary positions given are: Sun and Mercury in Libra, Moon in Cancer, Saturn in Aquarius, Jupiter in Gemini, Mars in Aries, Venus in Virgo, Ascendant Sagittarius. Calculation shows that the planets were all in the signs stated on 25th September 316 A.D.

NOTE 71. BIBLICAL CHRONOLOGY AND SYNCHRONISMS.

My views as to Biblical chronology from Abraham to Solomon have already been given (MB. 182). The chronology shows the arrival of Jacob in Egypt about 1985 B.C. and the Exodus about 1555 B.C. The tradition was that the Pharaoh under whom Joseph served was called Apophis. The Sixteenth Dynasty king,[31] Apophis, may have been on the throne in 1985 B.C. In any case the date must have fallen in the Hyksos period, and the earlier visit of Abraham is unlikely to have been before the date when the Hyksos became dominant over all Egypt in the Fifteenth Dynasty. Josephus when discussing the history of the Hebrews seems to have been of opinion that the first Hebrew settlement in Egypt was "almost 1,000 years" before the Siege of Troy (TA. I. 159) which would yield a date about 2200 B.C. 1555 B.C. falls in the reign of Amenophis II. whom Knight has shown to be probably the Pharaoh of the Exodus.* The entry into Canaan (1515-1507) corresponds in point of time with

* Since the above was written Professor Garstang's *Foundations of Bible History* has been published embodying the results of his excavations in 1930. He accepts the view that the Exodus took place in the reign of Amenophis II. He also suggests that Shamgar-ben-Anath who helped Israel about the time of the oppression by Jabin (Judges iv.-v.) is to be identified with the Syrian sea-captain, Ben Anath, who, according to Breasted (*History*, p. 449) "was able to secure a son of Ramses II. as a husband for his daughter." On my chronology Ramses II. reigned from about 1394 to 1328 while the oppression by Jabin was about 1361 to 1341 (MB. 182) thus harmonizing with this evidence. [Garstang taking on trust the usual later date for the Eighteenth Dynasty is forced to accept the "480 years" of 1 Kings vi. in opposition to the evidence of Acts xiii. 19-20, Judges xi. 26, and the summation of the periods of judgeship and periods of rest, which yield an interval of about 580 years from the Exodus to the building of the Temple (MB. 186).]

the Tel el Amarna tablets which "describe the anguish and terror of the Palestinian kinglets at the invasion of Canaan by a race of people whom they style the Khabiri."

That the Exodus took place in the reign of Amenophis II. seems to be borne out by a record in Manetho confirmed by a Greek papyrus of the Ptolemaic epoch (ME. 189ff.). A scribe called Hapi who had settled in Athribis had in the reign of Thothmes III. a son named Amenophis who in the reign of Amenophis III. had attained the age of 80 (and must therefore have been born before 1581). He was reputed to be a magician and his name was inscribed in the temple register along with those of the famous Imhotep and Djedi. Manetho relates that the Pharaoh Amenophis (by which name he denoted Amenophis II. only) asked the advice of Amenophis, son of "Paapis," who told him that he would be happy and would make Egypt happy if he expelled the impure strangers. He predicted that the strangers would summon the Hyksos back again and that together they would occupy Egypt for 13 years. "All occurred exactly as he said."

The story relates that the seer fell dead when he gave the king the information. This is impossible if he is to be identified with Amenophis son of Hapi who lived on into the reign of Amenophis III. unless we suppose that Amenophis II. reigned on some time as coregent with Amenophis III. In that case the date of the Exodus would require to be placed later than 1525 (13 years after the accession of Amenophis III.) which seems too late. The story of the seer falling dead is therefore possibly merely a picturesque addition to the narrative.

Josephus supposes that the reference is not to the reign of the king Amenophis, but Amenophthis or Merenptah of the Nineteenth Dynasty and relates that the king desired

to see the gods face to face "as his predecessor Horus had done" and that he expelled the impure strangers with the aid of his son Sethos.

The Biblical chronology of Israel from Solomon to the Fall of Samaria, and of Judah from Solomon to the destruction of Jerusalem may now be tabulated. No attention need be paid to the supposed synchronisms between Judah and Israel where they conflict with the lengths of reign given. They are generally admitted to have been inserted by a later hand. But the lengths of reign may be taken exactly as in the Bible, with one exception as regards the chronology of Israel, and three exceptions in the chronology of Judah. In the chronology of Israel Jeroboam II.'s reign may be 21 years not 41; in the chronology of Judah, Amaziah is at one point stated to have reigned 29 years (2 Kings xiv. 2) while at another he is said to have outlived Jehoash of Israel 15 years (2 Kings xiv. 17). There is only space in the chronology for 15 years of reign and possibly the original story was that he outlived Jehoash of Judah 15 years, having possibly been coregent with him during a previous 14 years. There is apparently the same type of error in regard to Uzziah and Jotham, for Uzziah became a leper (2 Chron. vi. 21) and his son Jotham was on the throne before his death. Possibly 52 years given as his sole reign really represents the combined reigns of Uzziah and Jotham. The reign of Manasseh 55 years is clearly an error for 45, the reign of his predecessor Hezekiah being fixed. (The date of the fall of Samaria quoted in terms of Hezekiah's reign is, no doubt, inserted by the later chronologist who was sychronising the history of Israel according to his own theory and is not to be trusted.)

Taking the Biblical figures thus, with these modifications they are found to yield the following results:

A. ISRAEL

Bible References	*Interval in years*	*King's Reign or Event*	*Date*
	40	Solomon	977-937
		Jeroboam	937-916
1 Kings xv. 25	2	Nadab	916-914
1 Kings xv. 33	24	Baasha	914-890
1 Kings xvi. 8	2	Elah	890-888
1 Kings xvi. 15	0	Zimri	888
1 Kings xvi. 23	12	Omri	888-876
1 Kings xvi. 29	22	Ahab	876-854
1 Kings xxii. 51	2	Ahaziah	854-853
2 Kings iii. 1	12	Joram	853-842
2 Kings x. 36	28	Jehu	842-815
2 Kings xiii. 1	17	Jehoahaz	815-799
2 Kings xiii. 10	16	Joash	799-783
2 Kings xiv. 23	41 (21)	Jeroboam II.	783-763
2 Kings xv. 8	$\frac{6}{12}$	Zachariah	763
2 Kings xv. 13	$\frac{1}{12}$	Shallum	763
2 Kings xv. 17	10	Menahem	763-754
2 Kings xv. 23	2	Pekahiah	754-753
2 Kings xv. 27	20	Pekah (Menahem II.)	753-733
2 Kings xvii. 6	9+	Hoshea	733-722
		Siege of Samaria	724-722

B. JUDAH

Bible References	*Interval in years*	*King's Reign or Event*	*Date*
1 Kings xi. 42	40	Solomon	977-937
1 Kings xv. 1	17	Rehoboam	937-920
1 Kings xv. 2	3	Abijah	920-917
1 Kings xv. 10	41	Asa	917-877
1 Kings xxii. 41-42	25	Jehoshaphat	877-852
2 Chron. xxi. 5	8	Jehoram	851-843
2 Kings viii. 25-26	1	Ahaziah	843-842
2 Chron. xxii. 12	6	Athaliah	842-836
2 Kings xii. 1	40	Jehoash	836-797
2 Kings xiv. 2	29 (15)	Amaziah	797-782
2 Kings xv. 2	52 (52)	Uzziah	782-746
2 Kings xv. 33	16	Jotham	746-730
2 Kings xvi. 2	16	Ahaz	730-714
2 Kings xviii. 2	29	Hezekiah	714-685
2 Kings xxi. 1	55 (45)	Manasseh	685-640
2 Kings xxi. 19	2	Amon	640-638
2 Kings xxii. 1	31	Josiah	638-607
2 Kings xxiii. 34	0	Jehoahaz	607
2 Kings xxiii. 36	11	Jehoiakim	607-597
2 Kings xxiv. 8-12	$\frac{3}{12}$	Jeconiah	597
2 Kings xxiv. 18	11	Zedekiah	597-587
		Jerusalem destroyed	587

The chronology thus deduced may be in error by a year or two here and there but where the narrative

mentions foreign kings and peoples the chronology is found to tally.

Solomon (977-937) was a contemporary of Hiram (969-936 according to the Phoenician lists) and Ahab (876-854) married the daughter of Ethbaal of Sidon (878-866 according to the Phoenician lists) (CA. I. 160). There is an Assyrian record "of the defeat by Shalmaneser at Karkar of a confederation including Ahabbu Sir'lai" presumably Ahab (CA. I. 160) which can be dated to 854 B.C. "Twelve years later Shalmaneser records the payment of tribute by Yana" presumably Jehu. This would be on his accession in 842 B.C.

The Biblical narrative records an invasion by Phulus in the time of Menahem. The Assyrian eponym canon shows that in 755 and 754 B.C. there were two expeditions to Syria by a king whose name does not appear in the limu list, but who reigned in Assyria from 763 to 753 B.C. (MB. 66ff.) According to Berossus in 755 B.C., Phulus ruled over Babylonia. Probably Phulus, therefore, was the king who ruled in Assyria from 763 to 753. The Biblical narrative records an invasion by Tiglathpileser in Pekah's reign. This is confirmed by an Assyrian record which, however, calls Pekah Menahem. As the Biblical narrative shows, however, the names of several of the kings were altered after they became vassals of the Assyrians, and Menahem may have been the name given to Pekah after the conquest.

Hoshea (733-722) sent messengers to So, king of Egypt (2 Kings xvii. 4). Zet of the Twenty-third Egyptian Dynasty reigned from 751 to 720 and may be the king in question. The fall of Samaria is recorded as in the 9th year of Hoshea, but it seems more probable that the siege commenced in his 9th year.

There are quite a number of references to Egyptian

and Assyrian kings in the history of Judah. Thus in the fifth year of Rehoboam (933-2) "Shishak king of Egypt came up against Jerusalem" (1 Kings xiv. 25). Sheshonk I. reigned[55] from 940-906 though he was not king of all Egypt till 926 B.C. In Asa's reign (917-877) Zerah the Ethiopian attacked Judah (2 Chron. xiv. 9). This may be Osorkon I. who reigned from 906 to 870 (Takelot I. being coregent from 891). Ahaz (730-714) "is mentioned among the tributaries of Tiglathpileser III. in 728" (CA. i. 161) while Sennacherib invaded Judah in the fourteenth year of Hezekiah (2 Kings xviii. 13) (701-700 B.C.). Hezekiah (whose reign ended about 685) also was threatened at one period with an invasion by Tirhakah (2 Kings xix. 9). This presumably is Taharka who commenced to reign[58] over Egypt in 690 B.C. According to the Biblical account Josiah was slain by the Pharaoh Necho (2 Kings xxiii. 33) in 607 B.C. Nechao 2nd ruled[59] in Egypt from 609 to 594 B.C. Necho was defeated by Nebuchadnezzar in the latter's first year (604-3 B.C.). This was also the fourth year of Jehoiakim (Jer. xlvi. 2). Amel Marduk on coming to the throne of Babylon in 561-60 liberated Jehoiakim, who had been in captivity from 597 to 560, reckoned 38 years in the Biblical narrative (2 Kings xxv. 27). The Biblical method of reckoning sometimes shows a discrepancy of one year owing to the fact that parts of a year appear often to have been reckoned as complete years.

NOTE 72. BABYLONIAN, ASSYRIAN, AND HITTITE, SYNCHRONISMS.

I have elsewhere given details of my Babylonian and Assyrian Chronology (MB.) and need only quote here some of the principal dates there deduced for Dynasties after the Flood (3189 B.C.).

Babel	*Erech*	*Akkad*	*Calneh*
1st Kish 3189-2699	1st Erech 3189-3006	Adab 3108-3018	Awan 3122-3115
	1st Ur 3006-2908	1st Lagash 3018-2895	Hamasi 3115-3108
	2nd Erech 2908-2906		Maer 2947-2801
	3rd Erech 2906-2881 2nd Ur 2881-2879 4th Erech 2879-2849 Gutium 2849-2724	Agade 2895-2714	Akshak 2801-2708
2nd Kish 2699-2635	5th Erech 2724-2717		1st Assyrian 2707-2635
3rd Kish 2635-2607	3rd Ur 2717-2609	2nd Lagash 2714-2616	2nd Assyrian 2635-2483
4th Kish 2607-2508	Ellassar 2609-2346	1st Isin 2616-2390	3rd Assyrian 2483-2268
" Amorites " 2508-2208 Sea Kings 2208-1984	Sea Kings 2346-1980	Sea Kings 2346-1980	4th Assyrian 2268-2011
Kashites 1984-1281			5th Assyrian 2011-1162
Assyrians 1281-1158			(Shi-Ninua to Ashurdan I.)

When my *Babylonian Chronology* was written the date assigned to the Flood by Langdon (LF. 84) was *circa* 4500 B.C. But he has since then announced in the *Illustrated London News* his discovery at Kish of a great flood deposit which he dates from the depth at which it is situated at approximately 3300 B.C.

At the moment of writing no further discoveries* have been announced which would either confirm or refute my dates. There are, however, several points which I did not comment on previously which have a bearing on Babylonian Chronology and which seem to confirm some of my deductions.

According to Josephus (BU. I. 720) Berossus related that 10 generations after the Flood there was a great Chaldæan learned in the science of the heavens. In Greek chronology the term generation was used as the equivalent of about 30 years. 300 years from my date of the Flood 3189 B.C. gives the date 2889 B.C. which in my chronology falls in the reign of Sargon of Akkad, from whose reign many astrological texts have come down to us. Thus an approximate check on the other evidence of the interval from the Flood to Sargon is obtained. (Josephus after

* Since the above was written the *Illustrated London News* of 27th June 1931 has appeared containing an account of the important results of the British Museum Excavations at Nineveh in the winter of 1930-31. These may have a bearing on the Chronology.

The famous temple of Ishtar was discovered. It was rebuilt by Ashurnasirpal, who was King of Assyria from 883 to 859 B.C. (MB. 119). On the site was discovered also a tablet of one of the kings, Shamshi Adad (presumed by Dr. Campbell Thomson to be Shamshi Adad I.). The tablet refers to the fact that Manishtusu, whom I date at about 2830-2814 B.C. (MB. 100) founded a building in the precincts of the temple of Ishtar.

Ishtar was the goddess of the planet Venus. Now in Assyria and Babylonia the most important risings were those in the first month and particularly if the planet rose in the morning near the date of rising of the Pleiades (cf. MB. 90). In the case of Venus, though once in eight years it rises nearer than at any other time within eight years, it rises specially close once in approximately 235-43 years. It is possible that Ashurnasirpal devoted special attention to Ishtar because such a rare rising occurred in his reign, namely that of 14th May 865 B.C.

It is permissible, therefore, to speculate that Manishtusu founded a building in her honour because such an event occurred in his reign or was expected to occur. Such a cyclical rising occurred on 2nd May 2793 B.C., close to the date at which the Pleiades then rose. In 2817 B.C. it had risen on 10th May and as every eight years it rose two or three days earlier, Manishtusu would know that the epoch was approaching.

As future discoveries may reveal other important dedications to Ishtar, the dates of other cyclical risings between these dates may be listed, namely, 4th May 2550, 6th May 2307, 8th May 2072, 9th May 1829, 10th May 1586, 11th May 1343, 13th May 1108. Wooley's date for Manishtusu (2566-2555) is also as will be seen near the date of a cyclical rising, but no other scholar whose chronology is known to me admits so late a date.

specifically stating that Berossus did not name the great Chaldæan, makes a guess that the great Chaldæan was Abraham, but no astrological texts are known attributed to Abraham and it is far more likely that Berossus' reference was to the great Sargon or an astrologer of his court.) It is also to be noted that Africanus dated the Flood in 3238 B.C. (C.F. 98) which is only 49 years different from my date.*

Another passage to which I would draw attention is a statement by Josephus (BL. III. 447) to the effect that the Ner was a "great year." Now I showed (MB. 22) that there was a strong probability that the original meaning of Ner was one sixth of a Saros† (one degree of precession or 72

* Since the above was in the hands of the printers an article has appeared by Ernest Mackay in *Antiquity*, December, 1931, in which he refers (p. 470), to a clay animal on wheels found at Ur by Wooley and dated by him c. 3500-3200 as having its "almost exact counterpart" in a broken toy found by Mackay at Kish unlikely to be earlier than 3100 B.C. He concludes that a shorter interval elapsed between the series of graves at Ur than Wooley supposes. Mackay's view is thus in harmony with the chronology which I proposed (MB).

Mackay also notes that the Indus valley people used designs and seals of a type used at Kish within a few hundred years before 2100 B.C. on the usually accepted dating (by which he means within a few hundred years before the "Amorite" Dynasty) but at the same period were using seals of a type found in Ur contemporary with Mes-anni-padda and the Ur graves dated by Wooley c. 3500-3200 B.C. The Kish seals, if dated 300 years before the "Amorite" Dynasty at Babylon belong to a date *circa* 2800 B.C. on my chronology (c. 2400 according to Langdon) while Mes-anni-padda reigned c. 3006-3005 B.C. (MB. 98). The interval between the two epochs is, therefore, much shorter—200 years as compared with between 800 and 1100 years in Wooley's Chronology.

Mackay also comments on what he regards as the rather extraordinary fact that a figure 8 pattern found in Babylonia c. 3100 B.C. does not appear in Egypt till over a thousand years later, being found on scarabs of the Thirteenth and later Dynasties. He is thus assuming that the "short" Egyptian chronology is correct, placing the Thirteenth Dynasty after 2000 B.C., but on my chronology the Thirteenth Dynasty was *circa* 3180-2727.

† The term "Chaldæan Saros" is used at the present day to denote an eclipse period of 18 years 11 days. There is no evidence that the Chaldæans ever so used the term. The first occasion on which the word Saros is known to have been applied to a period approximating to 18 years was in the dictionary of Suidas (who lived about the end of the tenth century A.D.). He considered that the period from the Creation to the Flood was 2222 years, that the Chaldæans regarded that period as 120 Sars (Σάροι), that a year consisted of 12 lunar months, and that, therefore, 1 Sar was equal to "222 lunar months which are 18 years and 6 months." Berossus, however, as I showed (MB. 24ff.), described the period from the heliacal rising of Alulim (Spica) at the Vernal Equinox to the Flood as 120 Sars (somewhat inaccurately): and the supposed period of 2222 years has no bearing on the question.

years) namely 12 years. But 12 years is the Jupiter year or Great Year. This seems to me to be additional evidence in favour of my interpretation of the measures used in the early King Lists.

As both the Sar and Ner are seen to have a rational basis we may speculate as to the reason for choosing a six hundredth part of a Ner as a unit of measurement. Now the Babylonian year being based on lunar months varied in length, for 1st Nisan might fall slightly over 1 month before the mean date or slightly over 1 month after the mean date of 1st Nisan so that 12 Babylonian years might be as much as 12.13 or as little as 11.89 Julian years, in other words of as many as 150 lunar months or as few as 147 lunar months. But 150 lunar months is 600 lunar quarters. Thus a lunar quarter may be the unit of measurement. The adoption of 600 units=1 Ner as a permanent equation is, of course, artificial, for there are not as many as 3,600 quarters in 72 years but the average number of quarters in 12 years would not give such a 'perfect' number, and this may have determined the choice. 60 units (15 lunar months) were equivalent to 1 Soss. The period may have been regarded as significant because no lunation within the 15 months occurred so close to the time of the original lunation. (The 17th, however, would be closer.)

There is a further point which was not known to me formerly, namely the terms of an omen describing an eclipse which preceded a Destruction of Ur. The description tallies with an eclipse of the Moon of 2974 B.C. and may relate to the Destruction of Ur by Eannatum. I deal with it in a separate note.[73]

Also in a separate note,[74] I examine the Pinches "Astrolabe," which from the positions of stars and planets yields a date 2892-91 B.C. As the antiquarians of Ashurbanipal's day all regarded Sargon's time as the acme

of astrological activity we are justified in supposing that this date fell in his reign. It does so in my chronology.

Though further discoveries may modify the dates assigned by me, we may provisionally adopt them and examine the various synchronisms and supposed synchronisms with Egyptian and Cretan civilizations, cultural and historical, and see how they fit in with the chronological scheme.

The first cultural factor of importance for synchronistic purposes is the painted pottery. All Assyriologists are agreed that this pottery was pre-Flood. Langdon considers that the latest date for its production in large quantities was 600 years before the Flood. Reckoning back from 3189 B.C. this would yield about 3789 B.C. (*c.* 4000 B.C. if deduced from Langdon's Flood date). Others consider that the painted pottery period lasted right up to the Flood (3189). All are agreed that the painted pottery exhibits a much higher level of the art than the later pottery in Babylonia, and that its production ceased very suddenly. Wooley (WS. 9) describes the type as follows: "the walls of greenish grey, buff, or red ware are sometimes extremely thin, and are ornamented with a decoration built up from simple geometric motives executed in a brown or black semilustrous paint."

Reference to my Egyptian chronology shows that in it the termination of the painted pottery phase in Babylonia synchronised with a date in the Twelfth Dynasty[35] (3373-3180) or some centuries earlier. Evidence from Dynasties preceding the Twelfth is scant, but "there is clear evidence that during the most brilliant period of the Middle Kingdom in Egypt the beautiful polychrome fabrics of contemporary Crete were beginning to come into favour" (EP. i. 266). A bridge spouted Minoan vase of this type was found accompanied by cylinders bearing the name of Senusrit III.

(3280-3241) and Amenemhat III. (3242-3194) (EP. i. 268). Thus a polychrome pottery period in Crete synchronised with a polychrome pottery period in Babylonia. As in Babylonia it terminated very suddenly, and Evans attributes its termination to a catastrophe. "It will be seen that the date of this catastrophe as indicated by the evidence from Kahun, followed shortly on the close of the first brilliant period of the Thirteenth Dynasty" (presumably a misprint for "Twelfth" Dynasty to which the Kahun evidence is assigned).

The fact that they synchronise so closely suggests that the pigments were supplied both to Babylonia and Crete by the same race. This race may well have been the round-heads who were almost wiped out by the Flood in Babylonia. But the Cretan pottery would be manufactured in Crete and the Babylonian in Babylonia for the styles are different, naturalistic designs being on the Cretan and geometrical on the Babylonian. There is, however, one very striking resemblance between pre-Sargonic pottery and Cretan pottery of the MM. II. period. They both show according to Ernest Mackay traces of being cut from the wheel by cord (JA. 60, pt. 1).

On Meyer's Chronology Amenemhet III. reigned about 1849 to 1801, about 1000 years after Sargon.

A similar cultural synchronism is afforded by the discovery by Petrie of pottery belonging to the period shortly after the close of the Twelfth Dynasty characterised by a zigzag on the neck similar to pre-Sargonic pottery in Babylonia (AE. 1926. 102). As on my chronology the Twelfth Dynasty ended in 3180 B.C. and Sargon commenced to reign in 2895, a period of about 3100 B.C. for this pottery is in harmony with my theory. On Meyer's Chronology the discrepancy is again over 1,000 years.

Baikie as I noted before has commented on the resem-

blance between Twelfth Dynasty jewellery and the jewellery of Queen Shubad of Ur.[88] The difference in date on my Chronology is not more than 100 to 300 years. On Meyer's Chronology it is about 1,200. I have also discussed above[86] the alabaster vases of Twelfth Dynasty type bearing the names of Manishtusu and Naram Sin.

One should perhaps mention in passing the theory (now abandoned by most Egyptologists) that the maceheads[78] of Naram Sin's time belonged to the same period as the maceheads of the Egyptian First Dynasty.

The theory that Naram Sin was contemporary with Menes was also thought to receive support from the fact that an inscription records that he conquered Manu, king of Magan. This Manu was thought to be Menes and Magan was thought to be Sinai and considered to be under his rule. The name Magan meant " the land of ships " (CA. i. 262). On a statue of Naram Sin it is recorded that the diorite of which it was made came from the mountains of Magan (KS. 244). Gudea also obtained diorite from Magan (KS. 258). He records that Magan, Melukhkha, Gubi, and Dilmun collected wood (KS. 262) and we also know that dates came from there (CA. i. 544). Further, it was called the mountain of copper and famous for goats.

The important points to notice are that the diorite differed geologically from that of Egypt (CA. i. 416), and that Magan was a timber producing country. It therefore is unlikely to have been Egypt proper, and most probably was on the East coast of Arabia or the West coast of India. In the time of Dungi the inhabitants of North West India " were loyal Sumerians who sent tribute to the great cults of Sumer " (CA. i. 416). As many Sumerian cuneiform inscriptions have been found in India, this favours the view that Magan denotes a portion of India.

Another point to note is that the lyre first made its

appearance in Egypt in the Twelfth Dynasty (EM. ii. 837) while the harp was already known in Ur before 3,100 B.C. (WU. 66). Are we to suppose with Meyer that the Egyptians were 1,400 years later than the Babylonians in using stringed instruments of this type ?

A rather significant synchronism is obtained from a lapis cylinder seal (JEA. VII. 196) which contains the Babylonian name Pikinili written in cuneiform and the name of an Egyptian king Sehetepibre. The character of the cuneiform resembles that of the time of Sargon of Akkad (2895-2839) and Naram Sin (2814-2777), so the Egyptian king referred to may be the eighth king of the Thirteenth Dynasty, Sehotpeibre III. (c. 3054-3052) or possibly one of the later kings whose name is missing was also called Sehotpeibre. On Weigall's chronology this Egyptian king reigned about 1880! All the "short" chronologies are out of harmony with this evidence.

Hall tries to get over the difficulty this way (CA. I. 303). He says that we must not pay attention to the cuneiform style but to the name Pikinili, which he says is of a period not earlier than Hammurabi. This assertion requires something stronger to support it than the mere fact that the name has not so far been discovered belonging to an individual of earlier date. It seems better to suppose that, if the style of cuneiform is different from that known to have been used in the time of Hammurabi and later, the seal cannot belong to that period.

In point of fact, however, if we look among lists of Babylonian and neighbouring kings for names ending in -ili the only king earlier than 1800 B.C. whose name does so is Gimil-ili of the Fourth Dynasty of Erech, who reigned in 2861-2855 (MB. 99) and was thus partly contemporary with Sargon.

Hall also asserts that "certainly the cutting of the

Egyptian signs is of the Twelfth Dynasty character" and concludes that the Sehotpeibre must necessarily be Sehotpeibre I. namely Amenemhet I. of the Twelfth Dynasty. He omits to mention that it is not known how far this Twelfth Dynasty style persisted into the Thirteenth Dynasty.

The next synchronism or hypothetical synchronism is contained in the legend of Ninus and Semi-Ramis. Ctesias, who lived for some time at the Persian Court in the early part of the reign of Artaxerxes (early Fourth Century B.C.) narrated that Ninus conquered "Egypt, Phoenicia, Coele Syria, Cilicia, Lycia, and Caria, Lydia, Mysia, Phrygia, Bithynia, and Cappadocia. Then he made himself master of the land of the Cadusians and Tapyrians, of the Hyrcanians, Drangians, Derbiccians, Carmanians, Chorasmians, Barcians, and Parthians. Besides these he overcame Persia, and Susiana, and Caspiana, and many other small nations" (D. ii. 3). Semi-Ramis subjugated Egypt, a great part of Libya, and nearly the whole of Ethiopia, and then made an unsuccessful campaign into India (D. ii. 8). The stories narrated by Ctesias are accompanied by such a wealth of detail that it is difficult to believe that they were not founded on fact. Certainly Semi-Ramis must have by her deeds created a remarkable impression for works attributed to her according to Strabo (XVI. 1. 2) were "pointed out through almost the whole continent." It can be proved that some were erroneously attributed to her, but this does not alter the fact that she must have been an outstanding personality in the first instance; otherwise legend would not have clustered round her name.

Duncker early drew attention to the fact that "Neither at the commencement nor in the course of the history of Assyria do the monuments know of a king Ninus, a queen

Semi-Ramis, or of any warlike queen of this kingdom. Once it is true we find the name Semi-Ramis in the inscriptions in the form of Sammuramat."

Now this Sammuramat lived towards the end of the Eighth Century, and though Herodotus may have confused her with the original Semi-Ramis she obviously could not be the queen who accomplished extensive conquests.

Fortunately since Duncker's day the Ashur list of kings has been discovered and discloses that there was a Ninus (Shi Ninua) c. 2011-1960 followed by a Semi-Ramis (Sharma-Ramman = Sharma Adad II.), 1960-1930, very near the period to which the early chronologists assigned them (MB. 117) and it can hardly be doubted that these were the Ninus and Semi-Ramis who became so famous.

On my chronology the Sixteenth Dynasty in Egypt began in 2020 and as little is known of events at that time it is possible that after the time of Joseph, perhaps about 1970 onwards, the Assyrians made attacks on Egypt. On Meyer's chronology the date falls in the Twelfth Dynasty.

From the later period there are a number of synchronisms.[30] Kadashman Enlil I. (c. 1526-1515), Karaindash I. (1528-1526) and Kurigalzu II. (1530-1528) of Babylon (MB. 15-16) were all correspondents of Amenophis III. (1538-1501). Asshuruballit (c. 1491-1476) (MB. 118) was the contemporary of Akhenaten, who commenced to reign in 1501, assumed Rasmenkha as coregent in 1489 and possibly continued to reign for some time after that. Shalmaneser I. of Assyria (c. 1380-1334) (MB. 118) was the contemporary of Ramses II. (1398-1332). These synchronisms also tally in Meyer's chronology for he lowers both the Babylonian and Egyptian dates roughly 100 to 120 years.

There is a description of a campaign in the 10th year

of Murshilish II., king of the Hittites, which contains what is regarded as a reference to an eclipse of the Sun (SA. 353). As Asshuruballit was probably king of Assyria about the time of the accession of Murshilish II. a precise date for the latter king would indirectly be of use for Egyptian Chronology, since Puzur Ashur V., predecessor of Asshuruballit on the Assyrian throne, was contemporary with Burnaburiash III., who was contemporary with Akhenaten. Unfortunately the month of the eclipse is not stated so that if small partial eclipses are admitted no conclusions of value can be drawn as there were many eclipses visible at Boghaz Keui. Within the period which would suit Meyer's Chronology there were eclipses in 1362, 1360, 1340 and 1335; but of these the only one which was large was that of 1340 which was total. Its date, 8th January, is regarded however as falling at an unsuitable period of the year for the campaign. Usually the ancients only commented on total or large partial eclipses and if it is considered that the reference here is to such an eclipse Meyer's Chronology is impossible.

In the first half of the Fifteenth Century there were eclipses on 1st June 1478 B.C., 4th October 1476 B.C., 30th March 1475 B.C., 22nd May 1469 B.C. and 11th June 1460 B.C., of which it is probable that at least one* was visible at Boghaz Keui as a total or large partial eclipse.

. . . . .

The inference to be drawn from my chronology in regard to the use of metal is that copper was known in

* Since the above was in print Hiller and Neugebauer's *Canon of Eclipses from 4200 B.C. to 900 B.C.* has been published. It shows the eclipse of 30th March 1475 B.C. as amounting to 11 digits at Boghaz Keui and occurring late in the afternoon. It was accordingly an eclipse likely to be noticed. A total eclipse, however, occurred on 3rd May 1375 B.C. and, therefore, a slight adjustment of Meyer's Chronology would make it tally with this evidence. Accordingly, we must regard the evidence of this eclipse as inconclusive as between the two chronologies.

Egypt and Crete in the 6th millennium B.C. (or even earlier) that it was known in Babylonia earlier than 3200 B.C. (perhaps also as far back as the 6th millennium or earlier), that bronze was not common in Egypt and Crete till about 3300 B.C. (perhaps earlier in Crete), and was late in coming into use in Babylonia, the earliest period in which tin has been found there so far being a little earlier than the First Dynasty of Ur, *c.* 3000 B.C., an adze head having been found some feet beneath buildings of the First Dynasty composed of an alloy of gold, silver, copper, with a trace of tin (EB. II. 247). If the Aegean was the centre of diffusion it is natural that this should be so, for Babylonia is far from the Mediterranean coast while Egypt had frequent intercourse with Crete and the Aegean.

An electrum mixture was used in Egypt at least as early as the Twelfth Dynasty while in Babylonia it was known before 3000 B.C. (EB. VIII. 54).

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NOTE 73. A DESTRUCTION OF UR.

There is an omen describing an eclipse of the Moon which occurred before an occasion when Ur was destroyed. It is dated 14th Adar and gives the time of eclipse very precisely as follows: "if in the evening watch it was covered and in the morning watch it was clear thou shalt look towards the South and observe the eclipse. To the king of universal dominion an omen is given; desolation of Ur, destruction of its walls. Grain . . . destruction of the city and its districts."

The night was divided into three watches, evening watch, middle watch, and morning watch. The probability is that the early Babylonians measured time at night by the elevation of the ecliptic stars which had risen at Sunset. When risen 60 degrees the first watch would end and the middle watch begin; when they had passed over the meridian and were 60 degrees above the Western horizon the middle watch would end and the third watch begin. Though dividing the semi-circle of the heavens into three equal portions, it would not be a correct division of the night into three equal times. Near the date of the Vernal Equinox the middle watch would be shorter than the others. But even so an eclipse of sufficient duration to last from evening to morning watch and falling at the time of night and season of year (Adar) stated must be exceptionally rare.

The reference is not to the eclipse of 2609 B.C. before the fall of the third Ur Dynasty, which was in the evening watch. (Schoch's eclipse of 2283 B.C. was in the evening

and middle watches, finishing near midnight long before the morning watch began.) The omen must, therefore, refer to one of the other occasions when Ur was destroyed. The fact that it is addressed to "the king of universal dominion" suggests that it is addressed to a king of Kish or who had conquered Kish (CA. i. 369). Thus Sargon of Akkad after conquering Kish took the title "King of Universal dominion" and we know that Eannatum of Lagash had also conquered Kish.

Eannatum tells us that he destroyed Ur (HS. 100) and we know also that Sargon razed the walls to the ground. Calculation shows that an eclipse of long duration occurred on the night of 26th/27th April 2974 B.C. and that the central time of the eclipse was very close to midnight. Theoretically the length of the night on that date from sunset to sunrise at Nippur where the astrologers would make their observations (Lat. 32°) was about 11 hours 38 minutes. The ecliptic stars rising invisible at sunset would be 60 degrees above the Eastern horizon after 4 hours 9 mins.

The middle watch would last	3 hours 20 mins.
From 60 degrees above West horizon to setting invisible at sunrise	4 hours 9 mins.
Whole night	11 hours 38 mins.

But probably the Babylonians reckoned by means of the stars first visible after sunset, which would reduce the extent of the middle watch. Further their estimates of angles may not have been quite accurate, or the star used at the period of the year may not have been near enough the ecliptic to give a true theoretical division, so that from various causes the middle watch may have been much shorter than stated above and the eclipse therefore long enough to last from evening watch to morning watch or they may not have intended the middle watch to be as long

as the other two. Certainly this is the only eclipse over a very long period which even approximates to the description given and I think it may be provisionally adopted as the eclipse in question. Sargon's date is otherwise fixed as later than this but I was previously unable to assign any precise date to Eannatum and placed him c. 2970-2960 B.C. (MB. 99). It now appears probable that 2974 B.C. fell in his reign.

NOTE 74. THE PINCHES "ASTROLABE."

A list of 36 stars, planets, and constellations (KU. 201ff.) called an "astrolabe" by Pinches is of considerable interest because the stars are grouped according to months, and also according to whether they belong to Elam, Amurru, or Akkad. Each month has one star (or constellation) of Elam, one of Amurru, and one of Akkad. A glance at the Elam stars shows at once that except for the transposition of those rising in Sivan and Duzu they are in the order of heliacal rising of the stars as confirmed by the Mul Apin Calendar. With one or two exceptions those of Akkad appear to be in the order of culminating at dawn. But when the calendar is adjusted to the time of year to show the Akkad stars on the meridian at dawn, it is found that the Elam stars on the dates given were about 30 degrees above the Eastern horizon at dawn, while the Amurru stars were about 60 degrees above the horizon, and these may be the positions denoted by Elam and Amurru.

In some respects these meanings of Elam, Akkad, and Amurru, have affinity with the divisions of the moon. The antiquarian astronomers of Ashurbanipal's time explained in regard to the moon (TR. II. lxxxv. 268) "the right of the moon is Akkad, the left Elam, the top* Aharru (Amurru), the bottom Subartu." In the case of the moon Akkad appears to mean the extreme west, but in the Pinches Astrolabe we are apparently dealing with a division only of the section of the heavens between the Eastern

* Geographically Amurru appears to have denoted the Western Land so that the uses of the term are very confusing.

horizon and the meridian, and Akkad denotes the extreme west of this section namely the meridian.

The months are grouped in threes: Sivan, Duzu, and Abu: Ululu, Tishritu, and Arahsamna: Kislimu, Tebitu, and Sabatu: and Addaru, Nisan, and Airu. The star names are mostly similar to those in the Mul Apin Calendar (MB. 71) which was shown to represent a date in the 29th century B.C.

Like the Mul Apin Calendar, the Pinches Calendar may be an ideal one of 360 days, corresponding really to differences in position of the sun's longitude. But the correspondence with the year is obviously one month later than in the Mul Apin Calendar, the months being regarded as in their mean position rather than their earliest position. In the Pinches Calendar exact days are not stated, but we may suppose that the first observation of each month corresponds approximately to the first decanate of the month, the second to the second decanate and the third to the third decanate.

In addition to names known from other calendars to be names of stars or constellations the Pinches Calendar has Marduk in Akkad in the third decanate of Adar, Dilbat in Elam in the second decanate of Nisan, Alkud in Akkad in the third decanate of Duzu (really Sivan) and Mushtabarru Mutanu in Amurru in the first decanate of Kislimu.

Marduk, Dilbat, and Mushtabarru Mutanu are well known from the comments of the later Assyrians as Jupiter, Venus, and Mars respectively. In one list of the stars of Akkad, obviously excerpted from this calendar, the word "Nibirum" is used in place of "Marduk" (KU. II. 202). In one of the Assyrian reports the word is explained as follows (TR. II. lii. 94): "Marduk is Umunpauddu at its appearance; when it has risen for two (or four?) hours it becomes Sagmigar; when it stands in the meridian

it becomes Nibiru." The use of Nibirum in one text, therefore, confirms that Marduk in Akkad means Marduk at the meridian. Alkud is not known from other sources, but if it is a planet (as seems likely since it would otherwise have been included in some of the star calendars) it must be Saturn, since the only other planet unnamed, namely Mercury, could not be at the meridian at dawn.

Having thus positions of four planets we may search for a date when all were close to these. They appear to tally for 2891-90 B.C. and we may reconstruct the calendar as follows:

Babyl. Date		*Approx. Julian Equivalent*	*Babyl. Star Name*	*Modern Equivalent*
		2891 B.C.		
Duzu (really Sivan)	1-10	4th July-13th July	Kaksidi (Amurru)	(Aldebaran high in East)
	11-20	14th July-23rd July	Mastabba (Elam)	Pollux (rose 16th June)
	21-30	24th July-2nd Aug.	Alkud (Akkad)	Saturn near meridian
Sivan (really Duzu)	1-10	3rd Aug.-12th Aug.	Sibzianna (Akkad)	$\zeta\beta$ Tauri + North Orion near meridian
	11-20	13th Aug.-22nd Aug.	Ura (Elam)	γ Leonis (rose 18th July) Regulus (rose 25th July)
	21-30	23rd Aug.-1st Sept.	Siru (Amurru)	Hydra's head high in East
Abu	1-10	2nd Sept.-11th Sept.	Ban (Elam)	$\epsilon\delta$ Canis Majoris (rose 7th Aug.)
	11-20	12th Sept.-21st Sept.	Mastabba Galgal (Amurru)	(Algenubi in East)
	21-30	22nd Sept.-1st Oct.	Margidda (Akkad)	Great Bear on meridian
Ululu	1-10	2nd Oct.-11th Oct.	Bir (Amurru)	Vela high in (South) East
	11-20	12th Oct.-21st Oct.	Badga (Elam)	Corvus (rose 8th to 20th Sept.)
	21-30	22nd Oct.-31st Oct.	Shupa (Akkad)	(Regulus near meridian)
Tishritu	1-10	1st Nov.-10th Nov.	Ninmah (Amurru)	(Crux near meridian)
	11-20	11th Nov.-20th Nov.	Zibanitu (Akkad)	($\alpha\beta$ Librae high in East)
	21-30	21st Nov.-30th Nov.	Entena Mashig (Elam)	α Centauri (rose 31st October)

Babyl. Date		Approx. Julian Equivalent	Babyl. Star Name	Modern Equivalent
		2891 B.C.		
Arahsamna	1-10	1st Dec.-10th Dec.	Urbe (Akkad)	Lupus on meridian
	11-20	11th Dec.-20th Dec.	Girtab (Elam)	Scorpio above horizon
	21-30	21st Dec.-30th Dec.	Rab or Lugal (Amurru)	$\epsilon \zeta$ Ophiuchi high in East
Kislimu	1-10	31st Dec.-9th Jan. 2890 B.C.	Mushtabarru Mutanu (Amurru)	Mars high in East
	11-20	10th Jan.-19th Jan.	Udkadua (Elam)	Cygnus (rose mid-December)
	21-30	20th Jan.-29th Jan.	Uza (Akkad)	$\alpha \beta$ Herculis on meridian c. 18th January
Tebitu	1-10	30th Jan.-8th Feb.	Gula (Elam)	Aquarius (rose Jan.-Feb.)
	11-20	9th Feb.-18th Feb.	Allul (Amurru)	(?)
	21-30	19th Feb.-28th Feb.	Idhu (Akkad)	Aquila near meridian (Altair c. 3rd March)
Sabatu	1-10	1st Mar.-10th Mar.	Numushda (Elam)	Fomalhaut(rose 12th February)
	11-20	11th Mar.-20th Mar.	Simmah (Amurru)	ϵ Pegasi in East
	21-30	21st Mar.-30th Mar.	Damu (Akkad)	$\delta \epsilon$ Delphinii near meridian c. 19th to 26th March
Addaru	1-10	31st Mar.-9th April	Ha (Elam)	ι Ceti (rose 14th March)
	11-20	10th April-19th April	Lula (Amurru)	α Pegasi high in East
	21-30	20th April-29th April	Marduk (Akkad)	Jupiter near meridian
Nisan	1-10	30th April-9th May	Dilgan (Amurru)	α Andromedae high in East
	11-20	10th May-19th May	Dilbat (Elam)	Venus above Eastern horizon
	21-30	20th May-29th May	Apin (Akkad)	$\beta \gamma$ Pegasi near meridian c. 14th-31st May
Airu	1-10	30th May-8th June	Mulmul (Elam)	Pleiades (rose 1st May)
	11-20	9th June-18th June	Shugi (Amurru)	Perseus high in East
	21-30	19th June-28th June	Annunitu (Akkad)	β Andromedae near meridian c. 21st June

There is a discrepancy in regard to the red Kaksidi and Shupa. In the Mul Apin Calendar these were Sirius and Spica respectively: but here they are inserted where we would expect Aldebaran and Regulus. This may be

due to a late copyist misunderstanding the nature of the calendar and inserting the names of stars rising, taking his cue from the Mul Apin Calendar.

In regard to the identification of the other stars Mastabba "the Twins" is here evidently used for Castor and Pollux, the term "Mashtabba Galgal," the "Great Twins," being reserved for the whole constellation which must have extended eastwards to Algenubi (ϵ Leonis) instead of westwards as in later times. From an omen text (TR. II. xlviii. 86) we know that Sibzianna was near the ecliptic for Venus went near it. It is probably ζ and β Tauri and North Orion. ζ and β Tauri were near the meridian at dawn at the date stated. The Mul Apin Calendar opposite Sibzianna gave the date of rising of its chief star Betelgeux (cf. also MB. 73). The identifications of Ura, Siru and Ban, tally with the Mul Apin Calendar. Kugler and others have shown that Margidda ("the Waggon") means the Great Bear and that Bir is the constellation now known as Vela.

Ninmah was one of the 12 chief stars of Ea (KU. II. 65). Kugler originally identified it with Hydra but afterwards abandoned this. He reads the Babylonian text as meaning that it is to the right of Nunki and identifies it as Carina (KU. II. 221) which is really to the left of Nunki.

To the right of Nunki is Crux, which was on the meridian while Zibanitum, the Claws of Scorpio ($\alpha \beta \zeta$ Librae) were in the East. The scribe has evidently transposed Amurru and Akkad here.

Urbe and Girtab are identified by Kugler and others as Lupus and Scorpio. It looks as if Lugal "the Great Man" meant Bootes + $\epsilon \zeta$ Ophiuchi. Arcturus itself had by the date stated passed over the meridian but $\epsilon \zeta$ Ophiuchi were still in the East. In the Mul Apin Calendar (MB. 71) opposite Lugal is the date 5th Abu. This may be

a copyist's error for 25th Abu which tallied with the heliacal rising of Arcturus. Udkadua was Cygnus in the Mul Apin Calendar. Uza is apparently the name of a constellation including Ma + Sal (Lyra) and extending to α and β Herculis. It means the goat and we find Manilius (or the Greek writer whom he followed) mentioning that Haedus rose with the stars of Libra, probably attempting to translate the Babylonian Uza from an ancient Babylonian Calendar. α β Herculis rose with Libra, but Lyra much later.

Gula and Idhu were Aquarius and Aquila respectively in the Mul Apin Calendar. Allul in that calendar was κ Orionis. It cannot be that here nor can it be Cancer with which Kugler identifies it.

Numushda is one of the principal stars of Ea which rises and sets before Ha (ι Ceti and Pisces). It is clearly Fomalhaut, a yellow star of the first magnitude. Simmah, Ha, Lula, Dilgan, Mulmul, Shugi, and Anunitu, were all identified in connection with the Mul Apin Calendar. There remain Damu and Apin. Damu must be the Dolphin. Apin was called "The forerunner of the Enlil stars" (KU. II. 52). It was recorded as between Lulim (α Pegasi) and Shugi (Perseus). β γ Pegasi and stars in the vicinity tally with this condition and also with the condition that they should be near the meridian in May.

From the dates of rising quoted for the Elam stars it will be seen that for the dates in the calendar they would all be approximately 30 degrees above the Eastern horizon at dawn.

For the dates postulated we may compare the position of the planets when the Sun was a few degrees below the Eastern horizon.

30th July	2091 B.C.	Saturn	on meridian
1st January	2890 B.C.	Mars	68 degrees above Eastern horizon
29th April	2890 B.C.	Jupiter	15 degrees from meridian
10th May	2890 B.C.	Venus	15 degrees above Eastern horizon

(It is rather a curious coincidence that on the dates stated the approximate longitudes were Saturn 351°, Mars 190°, Jupiter 292°, Venus 0°, so that Venus was exactly in the longitude of the Spring Point, Saturn and Mars were within 10 degrees of the Spring Point and Autumnal Equinoctial Point respectively: and Jupiter 22 degrees from the Winter Solstice Point.)

It will be noted that the planets tally with the positions given by the calendar. Jupiter and Saturn are only in the same relative positions on two or three occasions in every 800 years, and the occasions when Mars and Venus are also in the positions given in the calendar in the same year are necessarily much fewer, so that we may fairly describe 2891-2890 B.C. as the year to which this calendar probably refers.

When Ashurbanipal in the 7th century B.C. added to the royal library at Nineveh documents relating to the astrology of the ancient Babylonians and Sumerians, these included "The Day of Bel," 'which was declared by the learned of the time to have been written in the time of the great Sargon, king of Agade' (TR. II. xvi.). There are many other indications that the age of Sargon was a time of great astrological activity and it is therefore probable that this calendar was compiled in his reign. The date falls within the period assigned to him in my chronology, 2895-2839 B.C. In the chronologies which depart from Berossus, Sargon is placed as late as 2751-2696, and the only king reigning in 2891 B.C. according to Langdon was Gimil Shahan of Akshak and kings of the Third Kish Dynasty, but their age is not known to have been astronomically of importance.

NOTE 75. THE VALUATION OF EVIDENCE.

There are two ways of proving a theory. One is by showing the steps which led up to the theory. The other is by observing how far the theory tallies with the facts. A swimming instructor may explain to a pupil who has never seen anyone swim that by certain motions of his arms and legs he may propel himself through the water and at the same time keep his mouth above the surface of the water, and propound a theory as to why this should be so. The pupil may or may not understand the theory as to how this is possible but he will consider the instructor's statement correct if he gives a demonstration by swimming. If the movements of arms and legs in the manner described is coincident with forward motion through the water on every occasion when repeated a large number of times the pupil will be convinced that there is a connection between the movement of the limbs and the progress through the water. It will not matter in the least though the instructor's exposition of the theory was quite unsound. If his statement is corroborated by coincidences too frequent to be attributed to mere chance the pupil will believe him.

Similarly a cook may explain that he has mixed certain ingredients in a pudding and cooked it in a certain way and the chemical effect ought to be a pudding of delicious taste. His listener may know nothing of cookery or chemistry and the cook's explanation will therefore not convince him. For him "the proof o' the puddin' is in the preein' o' t." If every time the cook bakes his pudding

according to the recipe the result is in fact pleasant to the taste that will be all the proof required.

There are certain of my theories which could only be explained by giving a history of astrology from the time of Claudius Ptolemy to the time of William Lilly showing the importance attached to the planets and their rulership of the several signs of the zodiac, and the extreme importance paid to the "great," "greater" and "greatest" conjunctions of Jupiter and Saturn, and to other planetary cycles. I might also show step by step from century to century how conservative astrologers were and how in the 1500 years from Ptolemy to William Lilly astrological theory underwent almost no change at all, how unlikely it was that the theory was initiated by Ptolemy and how much more probable that it had come down from many centuries before his day, and, if it was slow to change in the Christian Era without the binding force of religious belief, how much more slowly would it change in early days when the planets were associated with the gods and astrology was bound up with religion. But if any retained sufficient interest to follow me through a book of evidence of this nature they might still be unconvinced at the end if my theory were not shown to tally with facts in circumstances where the chance of coincidence between fact and theory was so remote as to make it very highly probable that if they did coincide there was a necessary connection.

It therefore seems to me that not only in the theories depending on astrology but in all theory it is to the coincidence of theory and fact that we must look for our principal proofs and to a comparison of relative probabilities where these can be approximately estimated. In estimating probability I do not propose to make use of the intricacies of higher mathematics (which I have not studied) but a rough and ready method depending on simple arithmetic

which though less accurate will be sufficiently accurate for my purpose, and also more easily understood by the inexpert.

Now there is no such thing as absolute probability except in circumstances where all factors are known. There is absolute probability in many astronomical matters. Thus on a date taken absolutely at random without premeditation there is an absolute probability of 1 in 12 which equals $.08\dot{3}$ that the Sun will be in the zodiacal sign Aries. But the probability that a child will be born on a day when the Sun is in the sign Aries is different. The date is not then taken at random. It is conditioned by the fact that a child is born and study of records shows that more children are born at one season of the year than another and therefore the probability is not equal for each of the twelve signs of the zodiac.

In that particular instance owing to the accident that knowledge is available the absolute probability could be approximately calculated, but there are very many cases where circumstances conditioning the probability are not known, and what we do not know we must necessarily disregard. In the case of the great majority of facts or events we can therefore only calculate what I might call crude probability. It is as accurate a probability as the individual can calculate with the limitation of his knowledge, but with new evidence and increased knowledge the ratio of probability may require to be corrected. Now it is a convenience to reduce all probabilities to the same standard and the simplest standard is that which takes unity as certainty and fractions of unity (expressed by the decimal system) as the relative degrees of probability.

In practice this unity is rarely found, but when the ratio of probability is very high we are entitled in ordinary parlance to call it certainty though in reality it slightly falls short of theoretic certainty. It is a matter of opinion

as to the point at which the line should be drawn between various degrees of probability, but I propose to call anything over .9999 highly probable, anything between .9 and .9999 probable, anything between .5 and .9 slightly probable, anything from .0001 to .5 possible. But anything which is merely slightly probable may be easily overturned by new evidence and if one theory has a crude probability of .6 attaching to it and a conflicting theory a crude probability of .7 the first theory has to be classified pending increased knowledge as improbability. The fact that it is possible to have two conflicting theories with probabilities which added together exceed unity shows how limited is the knowledge brought to bear on each, for the probabilities of all possible theories based on the same facts should when added together equal unity and not exceed it ; but when calculating the crude probability of any theory I deliberately assume ignorance of the opposing theory or theories, which approach the subject from different angles and do not directly contribute to the fund of knowledge bearing on each theory under consideration.

The method I employ in computing the probability of a theory being correct is in a sense the converse of the computation of the probability of an event. Thus, for example, to take a theory quite unrelated to the matters at present under discussion, Sir James Jeans has propounded a theory that our Universe is finite. One piece of evidence in support of the theory is that radiations from the spiral nebulae show a lengthening of the radiated waves. Now if no test of the radiations of the spiral nebulae were made there are only three possible conditions we might (apart from Jeans' theory) expect to find, that they are not different from radiations in other parts of the Universe, or that they show a lengthening of the waves, or that they show a shortening of the waves. When then the test is

made the chance that they should show a lengthening and thus tally with Jeans' theory is not more remote than 1 in 3 as Professor Francis G. Baily has pointed out. Therefore though they do show a lengthening and thus tally with the theory, from this piece of evidence alone we can only say that, as there is a chance of coincidence of $\frac{1}{3}$, the probability that the theory is sound is not higher than the remainder of unity namely $\frac{2}{3}=.\dot{6}$. This we have agreed to call slight probability. So long as there is no opposing evidence it may hold the field as the most probable theory on the matter with which it deals but it may be very easily overturned, unless further confirmatory evidence of a different nature is forthcoming.

Now let us suppose that we have a piece of evidence itself a little doubtful, and a theory propounded on a basis of quite different evidence. If that theory is, when applied, found also to tally with the doubtful evidence it will yield a probability both that the evidence is sound and that the theory is sound.

In Egyptian Chronology many of the theories I have propounded are astronomical and the chance of the occurrence of certain astronomical events can be calculated, and therefore the chance of their correspondence with data from other sources, *e.g.* the chronology of Manetho, or a given date in the Wandering Calendar. These and other theories have been examined in the various notes in this book and the probability computed in a number of cases. Some of these may be tabulated here.

That the year spaces on the second line of the fragment of the Palermo Stone[7] refer to the years 5715-5705	.99995+	highly probable
That the Phœnix Period[8] has reference to Great Conjunctions of Jupiter and Saturn near Spica.	.9916+	probable
That all the dates in the List of Eratosthenes[9] are dates of Conjunctions of Jupiter and Saturn	.998+	probable

That Pepi II. commenced[19] to reign in 4276 B.C.	.99999+	highly probable
That Senousrit III. commenced[18] to reign in 3280 B.C.	.99998+	highly probable
That the astronomical figure[34] in the Ramesseum represents a date in July 2035 B.C. or earlier	.998+	probable
That the Ebers Calendar[37] is dated in or near the year 1674 B.C.	.98	probable
That the Athribis Horoscopes[9] represent *circa* 10th February 177 A.D. and 26th April 141 A.D.	.9999	very highly probable
That the Sothiac symbol in the horns of the Hathor cow[9] in the Athribis Zodiac A does not represent either Sirius or 1st Thoth but must represent either 1st Hathor Wandering or 1st Hathor Fixed, namely the Rising of Spica	.9	very highly probable

It will be seen that on this method the crude probability of some of the theories is fairly high. In addition there are many other theories included in this book with a slight probability in favour of the chronology given, so that the cumulative effect is really much greater than the effect of any one of these pieces of evidence taken singly.

In addition to crude probability it is of interest to estimate the relative probability between two opposing theories. To differentiate from the former method I express this type of probability in percentages. 100 thus signifies certainty and 0 impossibility. In this case, however, certainty does not mean certainty as against all other theories but merely that theory A is certainly to be preferred against theory B. I shall apply this method to two different estimates of the date of the Eighteenth Dynasty and also to two conflicting estimates of the date of the Twelfth Dynasty.

RELATIVE PROBABILITY OF EIGHTEENTH DYNASTY[39] DATES.

c. 1709-1449 *versus c.* 1580-1322.

The evidence for the date of the 18th Dynasty consists *inter alia* of

(1) The chronology of Manetho.[8]

(2) The Ebers Calendar[37] and Sed Festivals.[38]

(3) Synchronisms with Babylonia.[72]

(4) The Karnak Water Clock[69]

(5) New Moons of Thothmes III.[36]

(6) Festivals of the Beginning of the Seasons.[9]

(7) The possibility that the Bakenkhonsu of the reign of Rameses III. was the same as the Bakenkhonsu aged 86 under Rameses II.

(8) Seasonal Dates.[80]

(1) It is generally admitted that the date denoted by Manetho for the commencement of the Eighteenth Dynasty is at least as early as 1700 and possibly earlier. Those favouring 1580 presume errors in the text as we have it. Where Manetho can be checked by monuments his errors in the late period are much less than 10 per cent. So far as the evidence of Manetho goes therefore there is at least a 90 per cent. probability in favour of the earlier date and at most 10 per cent. in favour of the later.

(2) The Ebers Calendar and Sed Festivals of the Eighteenth Dynasty yield dates which by their progression in the calendar are clearly dates of the Rising of the Sothis in the 11th and 12th months of the Wandering Calendar. If the Ebers Calendar, the Athribis horoscopes, the Calendar of Esneh, and the Karnak Clock were not known it would be permissible to guess from the Sed Festival dates that Sirius was the Sothis and that the 11th month was Epiphi and therefore to adopt the later date for the Eighteenth Dynasty, but it is to be remembered that even the crude probability of this theory is very low for the chance of a given star rising on a given date of the Wandering Calendar within 120 years of the date indicated by Manetho is $\frac{240}{1460}=\frac{12}{73}$ and the crude probability is therefore only $\frac{61}{73}=.8356$ and therefore without certain evidence that the star referred to is Sirius the argument is of little

weight. But the Ebers Calendar distinctly states that Epet was then the 10th month, and that the Sothis rose on the 9th day of the following month (Re Hor Khouti). The symbol used for the Sothis is that used probably for Spica in the Athribis[66] zodiac A. Spica rose on the 9th day of the 11th month (Re Hor Khouti) close to the date denoted by Manetho. The chance of its rising on the date stated within 10 years of the year denoted by Manetho is $\frac{20}{260}=\frac{5}{65}$ so that the relative chances are 5 to 60 and the relative probabilities 60 to 5, *i.e.* 92.31 per cent. in favour of the earlier date and 7.69 per cent. in favour of the later date. This is really an under-statement of the probability of this evidence in favour of the early date as most will admit who read the note on the Ebers Calendar.[67] The above would be a true valuation if the Ebers Calendar had omitted the name of the month and the Spica symbol, only stating the number of the month and giving the Sothis symbol thus entitling the advocates of the late date to regard the 11th month as Epiphi and the Sothis as any measuring star without introducing ingenious explanations to explain away the apparent contradiction in the calendar.

(3) Some Egyptologists regard the lowering of the Eighteenth Dynasty date as justified by synchronisms with Babylonia given in the Amarna tablets, but this implies in the first instance the lowering of the Babylonian dates. The synchronisms are, of course, generally accepted and therefore this evidence depends entirely on the probabilities for and against the lowering of the Babylonian dates. The argument for lowering the date of Burnaburiyash III. who was the contemporary of Akhenaten was a statement by a scribe of Nabonidus' time that Shagashalti-Buriash reigned 800 years before 552, yielding the date 1352. When this inscription was discovered it was supposed to refer to Burnaburiyash III. and accordingly his date was

brought down. It is now recognised, however, that the inscription refers to Shagaraktishuriash who began to reign about 110 years later than Burnaburiyash began to reign. Assyriologists, however, assert that the scribe is in error by 100 years and that Shagaraktishuriash must have reigned about 1266-54 because Burnaburiyash must be brought down to synchronise with Akhenaten. Similarly though Berossus states that the Assyrian Dynasty (his "Sixth" Dynasty) at Babylon began 526 years before Phulus (*c.* 755) namely 1281 B.C. while Ctesias referred to a period of 123 years of Assyrian domination which is exactly the interval from 1281 to 1158 when the Pashe Dynasty commenced (dated by an eclipse probably referable to Rammanapiliddinna's reign) and the founder of that Dynasty was Tukulti-Ninurta who reigned 7 years at Babylon, and therefore from 1281-1274, having been reigning in Assyria alone for many years prior to that, to meet the short chronology his date has to be lowered to *c.* 1260-1225 (LF. 89) notwithstanding that the ancient records show that he was "600 years before Senecherib" who reigned from 704-680. We thus have Berossus, Manetho, and the Babylonian scribes all placing Burnaburiyash III. 100 to 120 years earlier than the date deduced from the supposed Sirius cycle. It is possible that all three were wrong, but as their evidence is given independently of each other and there is no contradictory evidence (apart from the King List A, which omits the Assyrian kings, and the synchronisms of the Ashur list which are admitted to be erroneous at this point) the chance is remote. The probabilities may be stated as 3 to 1, 75 per cent. in favour of the earlier date for the Eighteenth Dynasty, 25 per cent. in favour of the later.

(4) The Karnak Water Clock on my theory shows the summer night 12 fingerbreadths long. On the Sirius

theory and late date for the dynasty the water fell 12 fingerbreadths in spring and 14 in autumn. It is necessary to suppose on that theory that the clock is not the usual type of clock but a temperature clock, that it was kept in the temples, and that the temperature in the temples was hottest in September or October! I think those free from preconception will agree that the theory is impossible and therefore that this evidence yields a probability of 100 per cent. in favour of the early date and 0 per cent. in favour of the late date.

(5) New Moon dates of the reign of Thothmes III. were held to prove the low date of the Eighteenth Dynasty. The New Moon dates however tally also on my theory, so this evidence is 50 per cent. in favour of each chronology.

(6) The date of Thothmes III. being already determined by the Sed Festivals and other evidence it is found that the Festival of the Beginning of the Seasons (the conjunction of Jupiter and Saturn near Spica) occurred in the year stated. The chance of a minor festival so occurring is $\frac{1}{60}$ and of a major festival about 1 in 900. On Meyer's chronology it did not coincide. The relative probability here depends on the meaning Festival of the Beginning of the Seasons. Reference is made to its previous celebration in the reign of Senousrit III., the exact date being given, so that it is probable that it signifies the Great Conjunction at the major Festival. The relative probability in favour of the earlier date for Thothmes III. may be stated at least as high as 99 per cent.

(7) If the Bakenkhonsu of Rameses III. was the same as the Bakenkhonsu of Ramses II. the date of the preceding dynasties would require to be lowered. It would be nearly certain that the two were identical if in the whole of Egyptian records of kings and high priests names were never repeated. Needless to say that is not the case for

names were frequently repeated. A rough estimate shows that the names of 18 persons in 100 were repeated and therefore in the absence of other evidence there is an 82 per cent. probability in this case in favour of the later date.

(8) According to the late chronology and Sirius Sothiac theory the Battle of Megiddo was fought on 2nd May (Gregorian): on my chronology on 29th June (Gregorian). The harvest was brought for the troops. The harvest season at Megiddo was about 15th May to 3rd July. This evidence is not very decisive either way and (though slightly favouring my theory) may be stated as 50 per cent. for each.

The relative probabilities are therefore approximately as follows:

	For early date	*For late date*
(1) Manetho	90%	10%
(2) Ebers Calendar	92·31%	7·69%
(3) Babylonian Synchronisms	75%	25%
(4) Karnak Water Clock	100%	0%
(5) New Moon Dates	50%	50%
(6) Festival of Beginning of Seasons	99%	1%
(7) Identity of Bakenkhonsu	18%	82%
(8) Seasonal Dates	50%	50%

The evidence is not all of the same type and a true perspective will not be obtained by adding up the percentages and taking the average. Thus though 100 per cent. exceeds 90 per cent. by 10 per cent., and 90 per cent. exceeds 80 per cent. by 10 the superiority of 100 over 90 is much greater than the superiority of 90 over 80. In point of fact the evidence from the Karnak Clock alone more than counterbalances all the opposing evidence. But even those who do not appreciate this must concede that the evidence is very strikingly in favour of the earlier date, only one piece of evidence being in favour of the later (even though I have not included above Appearances of Amon and some other hypothetical astronomical evidence which appears to tally with my chronology).

Relative Probability of Twelfth Dynasty[35] Dates.

c. 3373-3180 *versus c.* 2000-1805.

The evidence for the date of the Twelfth Dynasty consists *inter alia* of

(1) The chronology of Manetho.[8]

(2) The Kahun Papyrus.[36]

(3) The Festival of the Beginning of the Seasons.[9]

(4) Seasonal Dates.[20]

(5) Estimate of time taken for change of style in art between Twelfth and Eighteenth Dynasties and cultural synchronisms.

(1) Even the "short" chronologists recognise that Manetho's summation of his second Tomos is 2121 years and that his figures as we have them would yield a date of *c.* 3400 B.C. for the beginning of the Twelfth Dynasty. But they argue that some of the dynasties he enumerates must have been contemporary, though where he can be checked by monuments it is clear that he usually discounts overlapping. Most of them, however, frankly admit that Manetho is not in their favour. Thus Hall says, "We might find support for it" (an early date for Senusrit III.) "in the long periods assigned by Manetho to the dynasties between the Twelfth and Eighteenth" (CA. i. 169) and Weigall apologises for his short chronology thus (WH. ii. 140): "But of course the most important argument in favour of my arrangement is that the Thirteenth, Fourteenth and Fifteenth Dynasties have got to be fitted into the period between the astronomically fixed date of the fall of the Twelfth Dynasty and the rise of the Seventeenth Dynasty" and Nicklin says (NE. i. 25): "It is evident that whatever these dynasties were (Thirteenth and Fourteenth) they were contemporaries of

some others if our astronomical evidence may be trusted." It is hardly necessary to add that it is their interpretation of the astronomical evidence on which Meyer and Weill lay stress and they also admit incompatibility with Manetho while Breasted informs us that " Manetho is not worthy of the slightest credence," thus making plain that Manetho's chronology does not agree with his. We may state that the chance of Manetho's date at this remote period being within 200 years of the correct date is fully 90 per cent., basing this estimate on the high degree of accuracy proved in the periods in which he can be checked by monuments, and disregarding assertions of inaccuracy based on theory only.

(2) The date of Rising of Sothis given in the Kahun Papyrus yields *circa* 1876 B.C. for Senusrit's 7th year on the Sirius theory. The chance of the date tallying within 1400 years with Manetho's date is $\frac{1400}{1460}$. In other words there is little chance about it. It is simply assumed that Sirius is the Sothis and the date is made to fit. As in fact Meyer's date differs from Manetho's by more than 1460 years the date to be selected depends on other factors. On the Spica theory the date tallies with Manetho within 100 years. The chance is $\frac{100}{1460}$ and therefore the crude probability is $\frac{1360}{1460}=.9315$. The probability as compared with the Sirius theory may be stated as 93 per cent. though it is really greater than that.

(3) The Festival of the Beginning of the Seasons was on the 21st of the 8th month in Senusrit III.'s 18th year. As we have seen the crude probability exceeded .99998+ in favour of 3263 B.C. It may be assumed that none would place the date at the previous Great Festival in 4176 B.C. (which was not on the 21st of the 8th month). The succeeding Great Festival was in 2409 but the date fell in the 3rd month and if any would like to see in this

date the 18th year of Senusrit III. they would require to postulate an artificial change of 5 months in the calendar, which seems exceedingly improbable. The Festival does not tally at all with the date postulated on the "short" chronology so that the probability here is 100 per cent. in favour of the earlier date.

(4) I have treated the Seasonal Dates[20] fully elsewhere. So far as they affect the Twelfth Dynasty they are indecisive, perhaps slightly favouring my own theory.* The probability may, however, be stated as 50 per cent. for each.

(5) When we come to theories based on evidence of stages of culture it has to be confessed that the mathematical method of estimating their probability has obvious shortcomings. A says that a piece of pottery is almost identical in style with another piece of pottery: B says they only slightly resemble each other: and C says they have well-marked differences. How can we decide mathematically whether it is A or B or C that is right? Again A, B, and C, are all agreed that a certain piece of pottery is of one type and that another is of a later type, but A says it must have taken at least 1400 years for the change, B says 800 years are ample and C says the development could quite well have taken place in 200 years. Are we to

* Since the earlier part of this book was printed off there has appeared in the *Bulletin* of the Museum of Fine Arts, Boston (XXIX. No: 174, p: 66) an account of an inscription of Senousrit III. discovered by the Harvard-Boston Expedition at Uronarti. The inscription is dated "year 19, month 4, Akhet Season, day 2." This corresponds in my chronology to 3262-1 B.C., April 23rd, Julian=March 28th, Gregorian. In the chronology of Weill (and Meyer) the date corresponds to about 1863 B.C. March 4th, Julian=February 16th, Gregorian.

The inscription records that the Nile was very low. "One had to find navigable water for getting past Yashemuk and hauling the boats, as the season demanded: every shoal likewise. As for the shoal of . . it was bad: it was far from easy to get through by hauling the boats over it on account of the time of year." The water of the Nile is lower on March 28th than on February 16th. In February in a normal year the shallow Egyptian boats would not be expected to have much difficulty. The balance of probability is therefore in favour of my chronology in this example.

solve our difficulty of deciding whether it is A or B or C that is right by counting the number of archæologists who subscribe to the views of each ? Surely not, for the majority for all we know might be composed of less competent persons than the minority.

It is, however, permissible to point out that prior to 1899 when Borchardt published his interpretation of the Sothic rising in the Kahun Papyrus none had estimated the interval between the Twelfth and Eighteenth Dynasties as so little as 225 years, even Meyer himself having estimated the *minimum* date for the commencement of the Twelfth Dynasty as 2130 B.C. and the *probable* date as presumably much earlier; while Champollion-Figeac, Bockh, Bunsen, Unger, Wiedemann, and Maspero, estimated the interval variously between 1000 and 1600 years; and Lepsius, Brugsch, Lieblein, Mariette, and Lauth assumed an interval between 500 and 900 years. But indeed, with the exception of Hall, there are in fact no Egyptologists who are prepared to dogmatise as to the length of the interval between the Twelfth and Eighteenth Dynasties on cultural grounds. When I say that he dogmatised I do not mean that he thought that from an examination of progress in art an exact date for the Twelfth Dynasty could be given, but he thought that the interval to the Eighteenth Dynasty must be about 500 or 600 years,* that those who say the interval is 200 years are certainly wrong and that those who say the interval is 1500 or 1600 years are also certainly wrong, and one writer who follows him says that the "admission of such a discrepancy as this could only lead to despair of the whole study of ancient times." One may be pardoned for hinting that those who value truth accept truth even if it should lead to despair. Yet,

* Which has not up to date been harmonised with any astronomical or calendrical theory.

Baikie, Budge, Capart, Peet, Petrie, and Sayce all preserve open minds on the subject without becoming unduly depressed and are willing to admit that theories based merely on estimates of rate of change of styles in art are inconclusive.

Of these scholars Peet and Sayce suspend judgment though the former tends to favour a short chronology: while Baikie, Budge, Capart, and Petrie favour a long chronology, though it has to be admitted that Petrie has recently modified his opinion. Since 1929 he has taken the view that the scarabs of the period of Khyan belong to a period close to the time of the Twelfth Dynasty, and since he identifies Khyan with Certus of the Fifteenth Dynasty and tends to rely on Manetho from that point onwards it follows that he must place the Fifteenth near the Twelfth and regard the Thirteenth and Fourteenth as overlapping, but all other cultural evidences he presumably still regards as compatible with an interval of as long even as 1600 years between the Twelfth and Eighteenth Dynasties, and if it were not for his identification of Khyan with Certus he would presumably consider that on cultural evidences alone it would be difficult to estimate what was the interval between Khyan's scarabs and scarabs of the Eighteenth Dynasty.

While Petrie has been remarkably successful in classifying scarabs and differentiating styles and postulating sequences of styles with a high degree of probability that his sequences are right, it must not be forgotten that evidence from scarab styles is usually regarded as the most fallacious type of cultural evidence. Thus Budge says: " When a scarab is found bound up in a mummy the date of which can be ascertained from the inscriptions upon it that scarab can be used with advantage as an authority by which to compare other scarabs; when, however,

a scarab is dug up with a lot of miscellaneous stuff it is of little value for the purpose of comparison. From the lowest depths of the Sixth and Twelfth Dynasty tombs at Aswan scarabs have been dug up which could not have been a day older than the Twenty-sixth Dynasty, if as old. . . . It must then be clearly understood that the objects found in a tomb do not necessarily belong to the period of the tomb itself and all the evidence known points to the fact that it is nearly impossible to arrange a collection of scarabs chronologically, except so far as the order of names is concerned" (BMM. 248).

Borchardt, Meyer, Weill, Scharff, Breasted, Weigall, and Nicklin on their own admission crowd the Thirteenth to Seventeenth Dynasties into two or three centuries because of their implicit belief in the Sirius Sothiac theory and not primarily on cultural grounds, though they naturally hold that such a short interval is possible so far as evidence from art goes.

Not only does one scholar differ from another but sometimes a scholar unconsciously expresses views in regard to cultural evidence which are inconsistent with his own views expressed elsewhere. Thus in regard to evidence from Crete, R. M. Burrows notes (BD. 44ff.) that a Syenite vase and Liparite and Diorite bowls were used by Sir Arthur Evans to connect Early Minoan I. with the first four dynasties of Egypt, but in 1903 the Syenite vase "was quoted by Mr. Evans to illustrate the contents of a pit near the East Pillar Room. This deposit was placed by him the next year no earlier than EM. III. and was shifted by Mr. Mackenzie in 1906 to MM. I." The Diorite bowl was found in 1902 "among some débris from the South wall of a store closet that contained a number of vases of MM. III. and although it may be earlier than the contents of the room, the interval of time need not be a great one.

The Liparite bowl . . . . was found . . . near some store rooms containing MM. pottery. . . . . Certain examples of Egyptian stonework, in particular a small Diorite bowl, which have quite as good a right to be dated from the first four dynasties as the three we have been discussing, were found by Mr. Evans as part of the first interment at the Royal Tomb at Isopata. In this case he is content to fall back on a theory of heirlooms or of later Cretan copies, and does not use them to prove an earlier date than MM. III."

(On the question of styles of writing the views of Egyptologists are also varied. Birch, Lepsius, Brugsch, Maspero, and Budge, who judged this evidence without the bias introduced by the application of the Sirius-Sothiac theory to the Kahun Papyrus, all favoured a long chronology on linguistic grounds.)

The very fact that there are such discrepancies of opinion shows in a measure the fallaciousness of arguments based on culture. In the circumstances, therefore, it is a mistake for any scholars who depend wholly on this type of evidence to be piqued if their view is not accepted by those with little or no first hand knowledge of the material. They must recognise that non-acceptance of their views does not imply contempt for their opinion or an assumption that their knowledge of their subject does not go deep but implies that the subject matter itself is in most cases not such as to contribute unimpeachable evidence from the chronological point of view.

Yet such as it is cultural evidence does undoubtedly contribute something to the elucidation of the problem. Where many objects are available known to belong to certain dynasties from inscriptions on them, or where there are stratified layers containing large numbers of objects, a certain sequence of styles can be (and has been) established

but the problem as to the duration of any particular phase must remain insoluble if extraneous evidence is not introduced, or records of lengths of reign are not accepted. For example, it is agreed that pear-shaped stone maceheads were in use in Egypt from the First Dynasty to the Eleventh Dynasty (EB. VIII. 51) and that seal cylinders were used from predynastic times to the Twelfth Dynasty (EB. VIII. 56), that is to say on the short chronology, a period of over 1,300 years, and on the long chronology of over 2,400 years. (Maceheads, " both round and conical, were used all over Babylonia and Assyria from Sumerian times down to the period of the last Assyrian Empire " [BB. IX. 63].) Again we learn that " a style of decoration in manganese black or purple on copper blue continued from the time of Menes till shortly before the Twenty-sixth Dynasty " (EB. VIII. 52) a period of about 3,000 years even on the short chronology.

But if examples had not been discovered clearly attributable to both ends of the sequences and to intermediate periods and if the King Lists were non-existent some archæologists would have been found to assert that these cultures did not extend over a period of more than 200 years, since it is a common error to suppose that the absence of evidence of a given type from a period certainly implies that there never will be evidence of that type discovered attributable to the period. An instance in point is the idea that no columns were known in Babylonia before Parthian days. This was a fixed idea in the minds of archæologists until within the last few years the discovery of a "column of segmentally moulded mud bricks " by Wooley clearly belonging to the period of the Third Ur Dynasty and discoveries by Langdon at Kish showed that columns existed in the third millennium B.C. (BQ. V. 74.)

It would thus be dangerous to assert in the absence of definite chronological evidence from other sources that a certain succession of styles, for example, of scarabs, occupied only a certain number of centuries. In the absence of all but local cultural evidence it would be as wise to guess 3,000 years as 200 for the interval from the Twelfth to Eighteenth Dynasties. These would be guesses and nothing more. Why should a liking for a style in scarabs change more quickly than a taste in colours or more slowly than some other predilection? Without extrinsic evidence the answer is not forthcoming, and if Wooley can say of Sumer "Art is subject to conventions so stereotyped that it is hard to distinguish between objects which are demonstrably hundreds of years apart in age" (WS. 187) we need not feel compelled to accept this or that hypothesis as to the rate of changes of styles in Egypt.

Cultural evidence has, however, been brought to bear on the chronological problem in another way. If there is another country of which the chronology is fairly securely fixed and we can establish that a product was in use there closely similar to an Egyptian product, both being in use for a limited period, this may raise a probability that the two synchronised, but here again unless the product is one of which large quantities have been excavated, applicable to each period, archæologists can only estimate very approximately the sequence limits in each of the two civilisations concerned. Further, unless the similarity is very close indeed one cannot be certain that the resemblance is not pure chance. Thus to take a parallel from another field the Staffordshire pottery of the 17th century has a remarkable resemblance to Byzantine pottery of the 13th century (RB.) and if we did not happen to know that they were separated by four centuries some experts

would have been found to declare that the two were contemporary.*

The chance of imitation at a late period of a style of an earlier period is also often overlooked. For example Dr. Evers stated that statuette No. 1229 in the British Museum was misdated by the British Museum scholars to the Middle Kingdom its true date being of the Saite period. Dr. Hall, however, explains "Of course the first impression one has of the figure is that it is Saite or later but this impression is corrected by the inscription which is obviously of the late Middle Kingdom" (JEA. XVI. 168). In other words from the style most Egyptologists would probably guess that the statuette was later than the 7th century B.C. whereas it belonged to about 3000 B.C. on my chronology, about 1800 B.C. on the "short" chronology, the error made by those judging by style being at least 1,100 years and probably much more. It is perhaps not to be wondered at, therefore, that the non-committal opinion of Dr. Baikie that estimates of date based on styles only are to be treated with caution finds favour with some people.

Bearing in mind the pitfalls we may tabulate some of

* A writer a few thousand years hence may be found to doubt our present day history books which place the Romanesque period of sculpture 1700 years after the Greek sculpture of 400 B.C. for, as Mr. Roger Hinks says when reviewing *Medieval Sculpture in France* by Arthur Gardner (*Observer*, 28th February, 1932): "It can hardly be doubted that the European mind whether in Attica about 500 B.C. or in Burgundy or Provence about 1100 A.D. naturally tends to express itself in the same way, once it has managed to assimilate foreign influences." A few lines earlier he remarked: "Whatever the social historian may think of the cyclic theory of the progress of civilization, it does appear as though the will to form repeated itself in a closely similar manner amidst circumstances which differ greatly in other respects. Mr. Gardner several times remarks upon the notable formal resemblances between archaic Greek and Romanesque sculpture between the draperies of the 4th century B.C. and the 13th A.D. and between the prettiness of a Hellenistic terra-cotta and of a 14th century ivory. These repetitions may be explained to a slight extent in the latest period by the actual imitation of antique models; but this does not apply to the earlier phases when the correspondence is almost more striking."

the cultural phases which have been referred to in the previous notes and see how the synchronisms work out on the long and short chronologies.

Cultural Phase	*Babylonia*	*Egypt or Crete*	
		Self	Meyer or Evans
1. Stars first used as time measure	c.14,500 B.C.	c.14,500 B.C.	—
2. Stone maceheads	c.6000-600	c.5800-3400	c.3300-1900
3. Painted Pottery Phase	c.3800-3200	c.3500-3200	c.2900-1800
4. Use of Harp or Lyre begins	c.3300	c.3300	c.1900
5. Potter's wheel introduced	Before 3200	Before 3200	c.2400
6. Pottery cut from wheel by cord	c.3100	c.3200	c.2180-1800
7. Zigzag pattern on pottery	c.3100	c.3100	c.1800
8. Jewellery of Shubad of Ur resembling 12th Dynasty Jewellery	c.3100	c.3200	c.1900
9. Bull Rhytons of MM.II. style	c.2900	c.3500-3000	c.2100-1800
10. Alabaster Vases of Twelfth Dynasty style	c.2800	c.3200	c.1900

It will be observed that with the exception of the first two items all the items show that similar cultures synchronised in point of time or nearly so on my chronology but in the majority of instances did not synchronise at all on Meyer's chronology.

As regards stone maceheads it has been argued that because Naram Sin used stone maceheads similar in shape to the pear shaped stone maceheads of the early Egyptian dynasties he was certainly contemporary with them. If stone maceheads are being used at all it is obvious that the shapes of these maceheads will be one of three main types, pear shaped (or "conical"), spherical (or "round"), and ovoid, and that the chance of the shape of stone macehead preferred in any period being of one particular type is not more remote than 1 in 3 or 1 in 4, so that such similarities in any two civilizations are not sufficiently detailed to warrant us in assuming that the civilizations synchronised and borrowed from each other.

A similar argument has been used in regard to cylinder seals, but anyone who has examined the reproductions of

the early Egyptian cylinder seals (HP.) and compared them with the Babylonian seals of post Flood times will observe that the only thing in which they resemble each other is the fact that they are seals and cylindrical, the pictures on early Egyptian seals being crude in the extreme compared to the Babylonian, and no more like the seals of Naram Sin's time than they are to the seals of Darius (EB. II. 845). None has yet had the foolhardiness to declare that Menes was contemporary with Darius from this evidence but it is just as logical as asserting that he was contemporary with Naram Sin. (Even Hall in spite of his anxiety to discredit the long chronology admits that "the earliest Egyptian cylinder seals appear to have been of wood and probably first made of bits of reed, carved, whereas the Sumerian seals were stone, and of a different shape, like a concave-sided reel, the Egyptian cylinders being straight-sided as the Babylonian became later" (CA. I. 581).)

The Egyptian slate carvings of the First Dynasty were compared with the early bas-reliefs of the Sumerians, the employment of brick in Egypt was supposed to be due to Babylonian influence, as also the practise of irrigation, and the growing of wheat (KS. 323). It may seem unnecessary to mention these theories (as their weakness has been shown by King [KS. 329-30] and they have fallen out of favour with most Egyptologists) were it not that Dr. Waddell has recently revived them.

It is possible that there was contact between Egypt and Babylonia but as King points out the cultural resemblances mentioned are not close enough in detail to warrant the assumption that the First Dynasty synchronised with Naram Sin. Building in brick, the practise of irrigation, and the growing of wheat were probably also known in Babylonia 2,000 or 3,000 years before Naram Sin's time. Bas-reliefs may have been.

These arguments have recently been reinforced* by Von Bissing who has discussed supposed resemblances between "pottery stands, cylinder seals, forms of boats, brickbuilding, the motif of the man between two lions on the Gebel Araq knife-handle, the snake-necked leopards, and so on—but in none of these does he see reason to believe that there was any real connection between Egypt and the contemporary civilizations" (AE. 1929. 63) in the Predynastic and early Dynastic periods.

There is, however, the case of the Babylonian cylinder seal found in Crete in an MM. I. b. or II. deposit. This as we have seen,[88] if certainly in association with objects of its own period, would be strongly in favour of the short chronology: but its value is considerably diminished by the extraordinary frequency with which objects of quite different epochs are found in association in Crete.

. . . . .

The cultural evidence, therefore, may be said to show a ratio of about 8 to 2 in favour of the long chronology. That is admittedly a very inaccurate measurement, for the types of evidence compared are not all of equal validity and the figures are perhaps more favourable to the long chronology than the evidence warrants; but though the true ratio may not be 8 to 2, nevertheless, such as it is, it unquestionably favours the long chronology.

Even so on cultural evidence alone I would not be prepared to use a stronger term than slightly probable to the chronology proposed. While cultural resemblances may sometimes support chronologies based on other independent evidence they are only rarely strong enough

* Since this book was completed an important article by Dr. G. A. Reisner has appeared in *Antiquity*, June, 1931, in which *inter alia* he ennunciates the following principle (p. 206) "Primitive peoples in the same state of culture having similar needs and similar materials are apt to produce objects and decorations of a similar appearance."

to entitle anyone to base a definite system of chronology on them and to deny the validity of other evidence.

But with this rough estimate of the value of the cultural synchronisms, we may now summarise all the evidence we have just examined in regard to the date of the Twelfth Dynasty.

	For early date	*For late date*
(1) Manetho	90%	10%
(2) Kahun Papyrus	93%	7%
(3) Festival of the Beginning of the Seasons	100%	0%
(4) Seasonal Dates	50%	50%
(5) Cultural Evidence	80%	20%

It will be seen that the evidence favours the long chronology. Some of those who are "short" chronologists may perhaps read the first pages and the last few pages of my book and, if they are of the number who claim infallibility for their views, they may say to themselves "ridiculous, of course, he can't be right," and read no more, but I hope that some will have the patience to read the book from cover to cover and that if after that they do not accept my chronology they will at least admit that there is a considerable body of evidence which at present cannot be explained if the short chronology is accepted.

ADDENDA AND CORRIGENDA.

Page 161. Delete lines 27 to 29, "The oblong . . ." to ". . . of the year."

Page 229. Add the following paragraph:

Rameses II. at some date later than his 34th year carved the temple of Abu-Simbel out of rock. The symbol of Ra, the rising Sun, is above the door. Within the temple behind the altar sat Amen (Jupiter), Ptah (Arcturus), Horus-Ra (the Sun), and Rameses himself. Jupiter rose heliacally about 26th October (Julian), 1352 B.C., within a few days of the date when Arcturus set heliacally. E. M. Plunket in *Ancient Calendars and Constellations* (1903), p. 40, quotes a writer in the *Pall Mall Gazette* of 20th April, 1892, as saying that the temple was so oriented that from the Shrine on 26th February (Gregorian) he saw the Sunrise. The Sun's declination (to be visible rising) would thus require to be about 9° S. It had a declination of about 8½° S. on 26th October (Julian), 1352 B.C.

Page 234. In the penultimate line after "Menpetirah" add: Struwe has suggested (AZ. LXIII.) that it represents Mernephthah, a name of Seti I.

Page 289. Add the following paragraph:

In addition to the special Festivals of Isis, private individuals may have regarded any rising or setting of Mercury as a suitable time to worship Isis. Thus many dates of worship are quoted by Letronne. The years to which they refer are not always certain but he quotes a date 25 Tybi and a date 10 Mechir, both referred by him to 79 B.C. 25 Tybi was then equivalent to 4th February, and 10 Mechir to 18th February, in the Southern Wandering Calendar.

Calculation shows that Mercury's evening setting occurred about 2nd February, and its morning rising about 20th February in that year.

There are also two inscriptions of 17 Mesore in the 31st year of Augustus, equivalent in the Southern Wandering Calendar to 2nd August 2 A.D., and in the Northern Wandering Calendar to about 9th August. Calculation shows that the evening rising of Mercury occurred about 7th August 2 A.D.

There are on the average 4 risings or settings of Mercury in 116 days, *i.e.*, 1 in 29 days and an examination of accurately known dates of worship of Isis would show whether the dates selected for worship corresponded frequently with the risings or settings of Mercury.

Page 314. After the first paragraph add the following paragraph: In addition to the evidence given in other notes that the New Year of the Ancients began at the beginning of fixed Hathor, the rising of Spica, there is a quotation in Budge's *Gods of the Egyptians* which is of interest in this connection, part of an address by Ra to Sekhet (BGE. I. 366): "There shall be prepared for thee vases of drink which shall make thee wish to sleep at every Festival of the New Year, and the number thereof shall be in proportion to the 'number of my handmaidens': and from that day until this present men have been wont to make on the occasions of the Festival of Hathor vases of beer which will make them sleep in number according to the number of the handmaidens of Ra." The Festival of Hathor was naturally held in Hathor, not in Thoth. From this inscription it appears probable that it coincided with the Festival of the New Year in ancient times and therefore that Hathor, not Thoth, was formerly the first month of the fixed Calendar.

Page 322. Add the following paragraph :

Letronne in his *Inscriptions de L'Égypte* (1842-48) suggested that " the day of Augustus " mentioned in an inscription of 1 A.D. as falling in the month Thoth might be his birthday anniversary and concluded that this was definite evidence of the use of the Alexandrian Calendar as early as 1 A.D. since 23rd September, his birthday, then fell in Menkhet of the Wandering Calendar but Thoth of the Alexandrian. But if the Northern Wandering Calendar which I postulated were still in use it would fall in Thoth in it. Further if in 26 B.C. the equivalent in Thoth was fixed as " the day of Augustus " the Egyptian date of the celebration would not be altered even though later it did not correspond with the Roman anniversary. (In any case Augustus' birthday was 22nd September in the Republican Calendar, which may have been equivalent to 21st, 22nd, or 23rd September astronomical Julian.) This evidence is, therefore, inconclusive, though it is quite possible that the Alexandrian Calendar was in use by 1 A.D.

Page 335. Add the following paragraph :

Letronne in his *Recherches de L'Égypte* (1823) refers to a dedication to Aphrodite dated Hathor 21 belonging to some year between 32 and 37 A.D. The morning rising of Venus (Aphrodite) occurred about 29th October 34 A.D. a few days before Hathor 21 of the Wandering Calendar, then equivalent to 3rd November. That was its nearest rising to Spica in its 8 year cycle. Aphrodite was, however, also sometimes identified with Hathor itself.

Page 344. Add the following paragraph :

Berossus indicated that the omen of the Flood was the presence of "all the wandering stars

together in Capricorn." Now it is generally admitted that most of the Babylonian astronomical omen texts do refer to configurations of the planets which had been observed and noted. In all such cases the omens preceded the events to which they were supposed to refer. The astronomical omens of most importance other than eclipses were those seen on the evening of the visible New Moon each month.

In searching for a date of interest in this connection, the Sun's position may be disregarded for it could not be visible at the same time as the planets. Mercury also is so difficult to see with the naked eye that it would be of little importance to the early inhabitants of Babylonia. Of the remaining "wandering stars" known to the ancients, namely Moon, Venus, Mars, Jupiter, Saturn, all except Mars were visible in Capricorn immediately after nightfall on 10th November (Julian) 3224 B.C., the positions being approximately as follows:

	Moon	*Venus*	*Jupiter*	*Saturn*
Longitude from Spring Point	227½°	239°	227°	229¾°
Longitude in Zodiac measured from Spica	Capricorn 6	Capricorn 17	Capricorn 5½	Capricorn 8

That was the evening on which the New Moon was first visible in that month.

Such a combination of planets in close proximity in Capricorn on the night of New Moon is relatively rare and would be specially noted. Even if it occurred about 34 years before the Flood it might afterwards be included in the list of omens though in the exaggerated form "all the stars together." The fact that so many were in Capricorn at that time and that the tradition associating such an omen with the Flood existed rather tends to favour the view that the Great Flood took place about that period.

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* In the widest sense.

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Chronology >< Egypt